

FIG. 1A

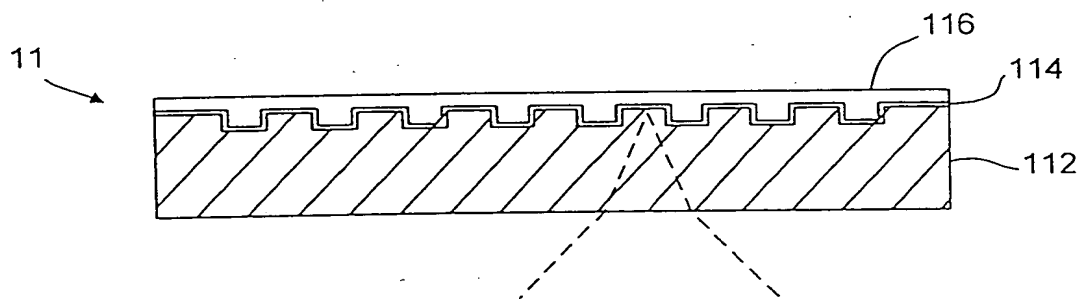


FIG. 1B

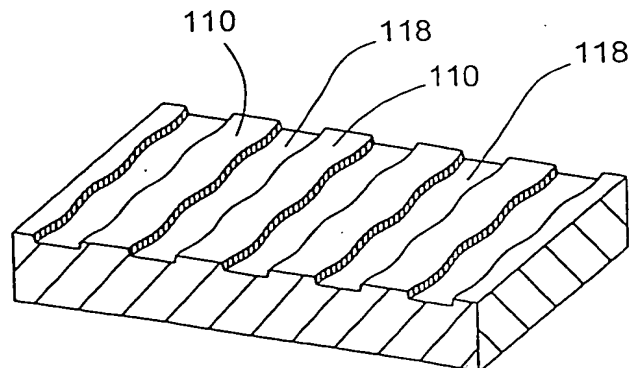


FIG. 1C

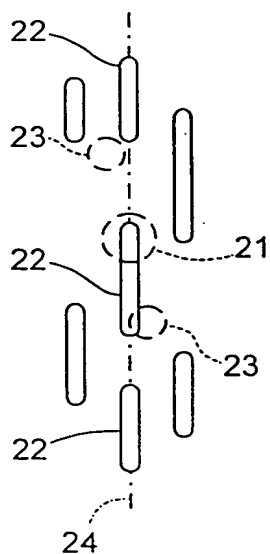


FIG. 2A

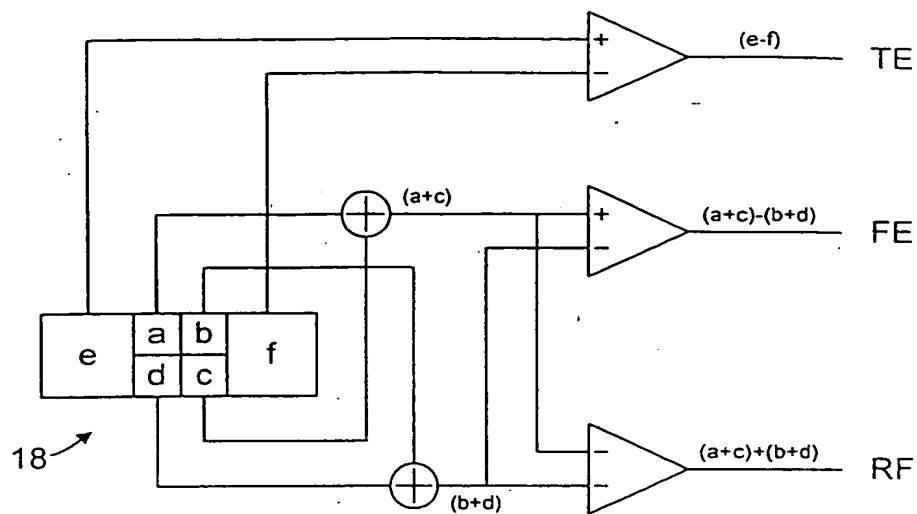


FIG. 2B

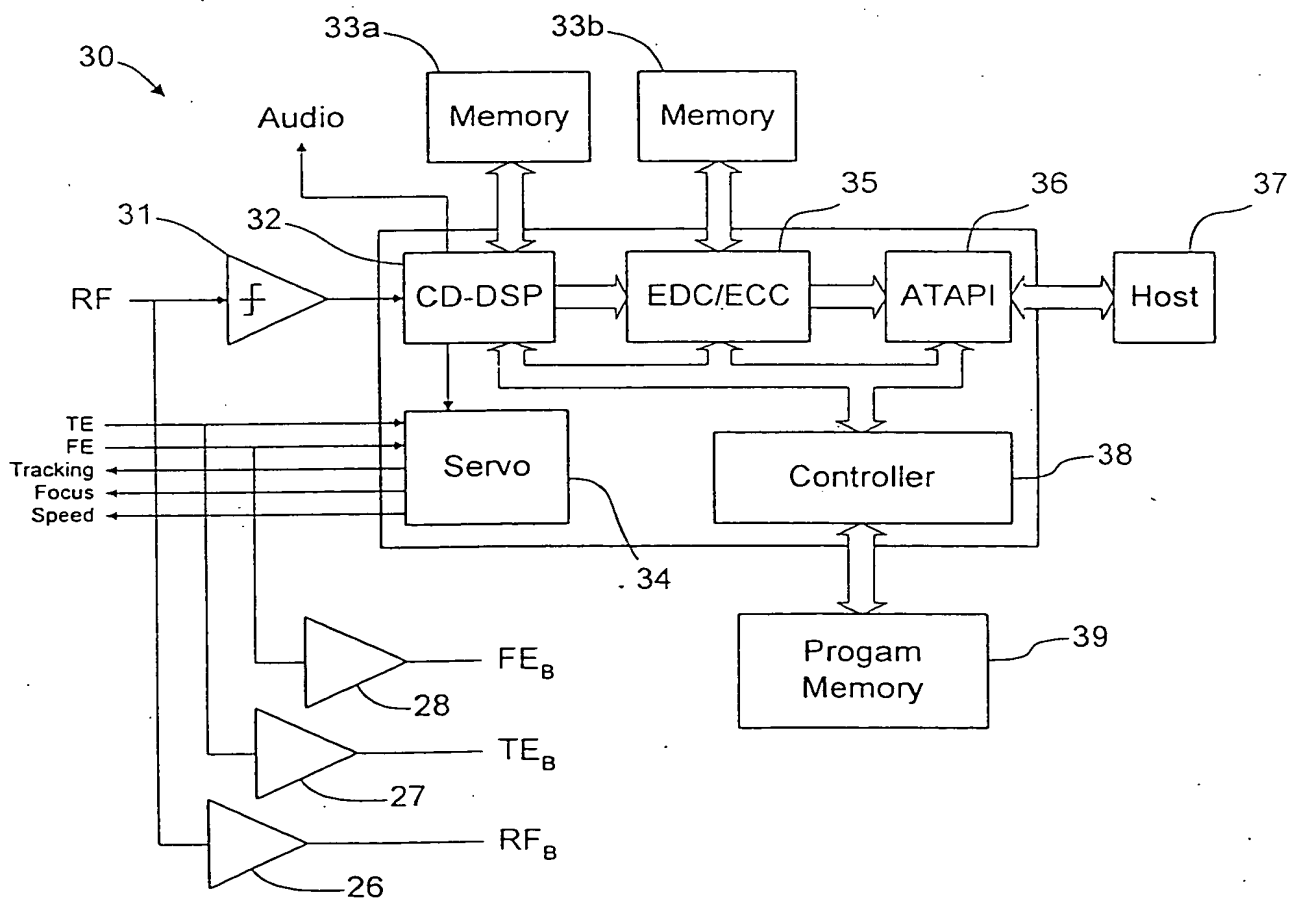


FIG. 3A

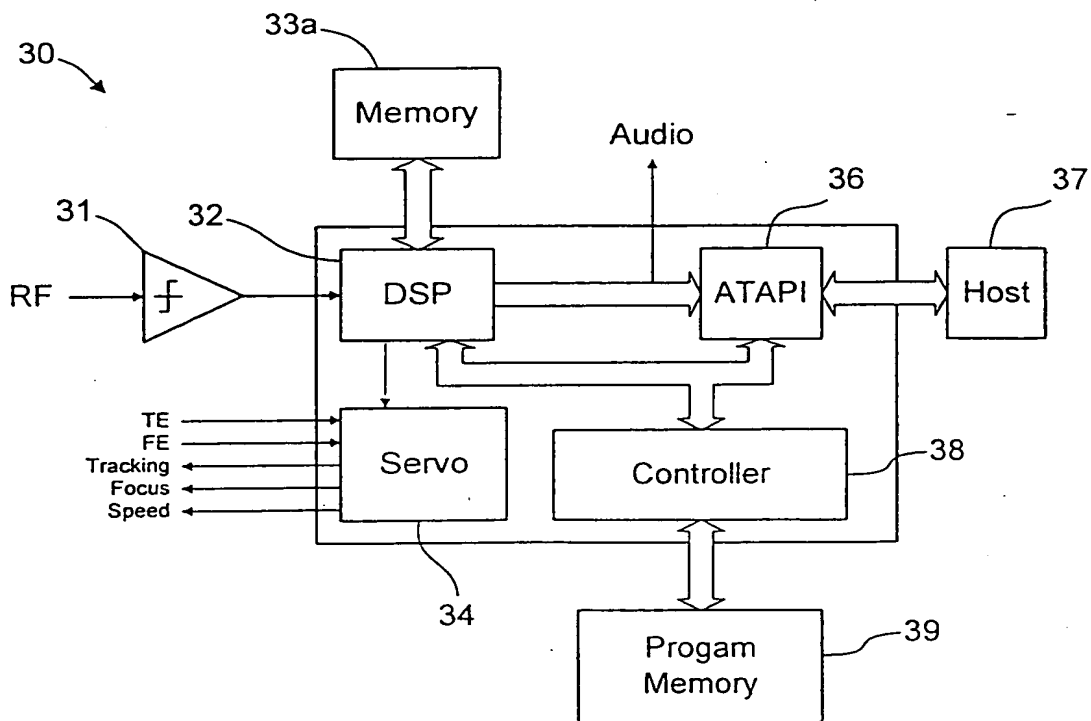


FIG. 3B

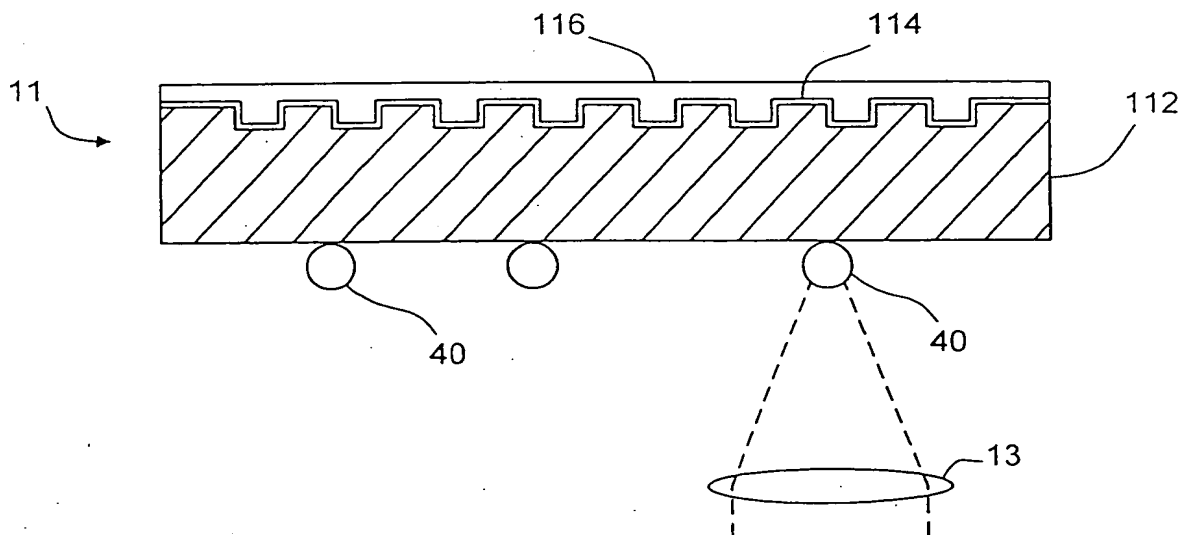


FIG. 4

+

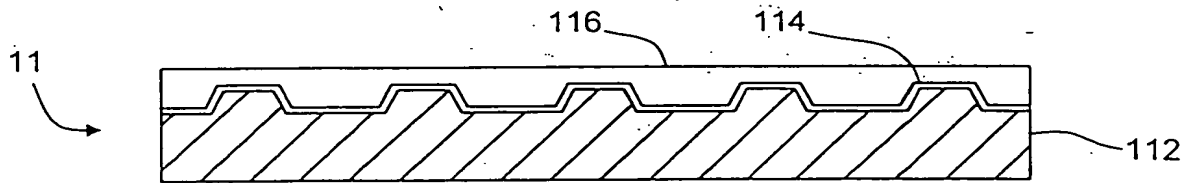


FIG. 5A

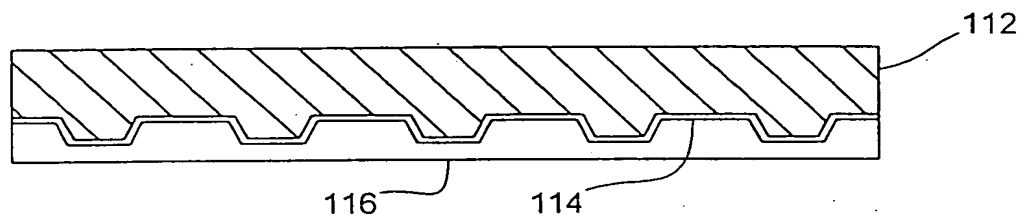


FIG. 5B

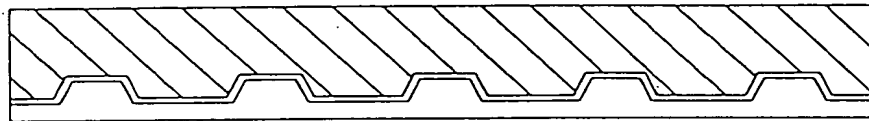


FIG. 5C

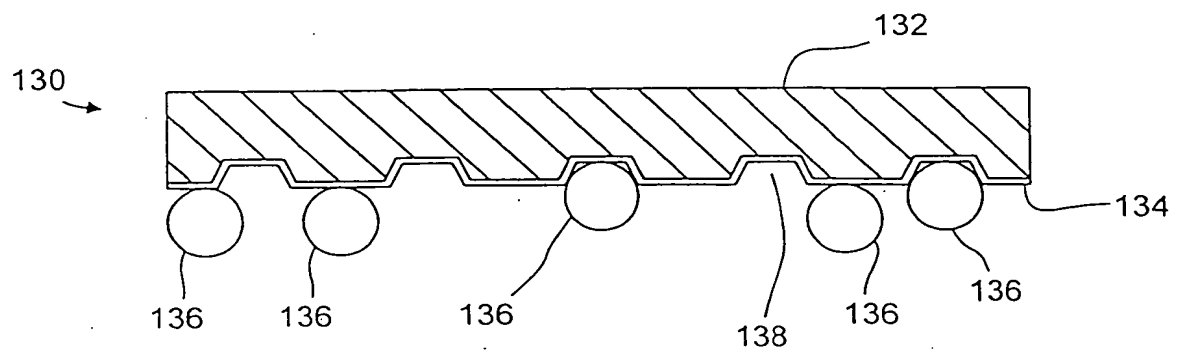


FIG. 5D

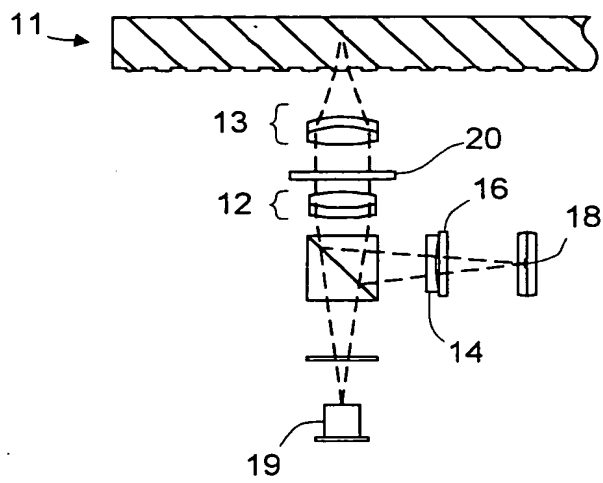


FIG. 6A

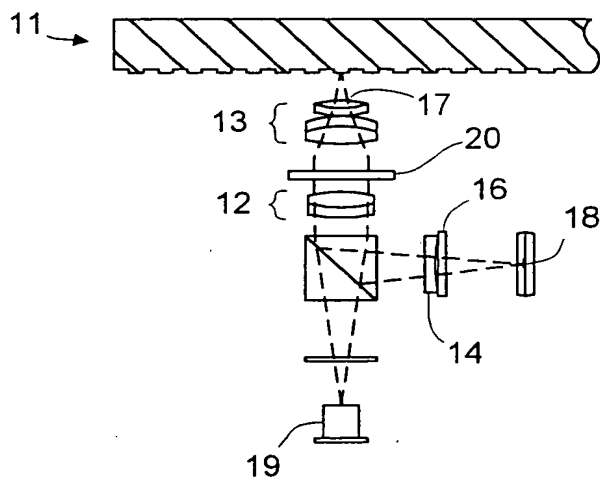


FIG. 6B

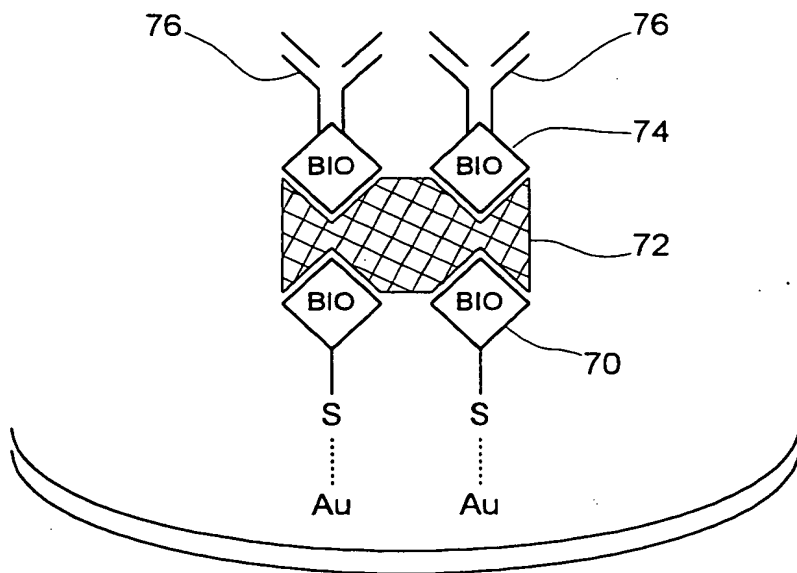


FIG. 7A

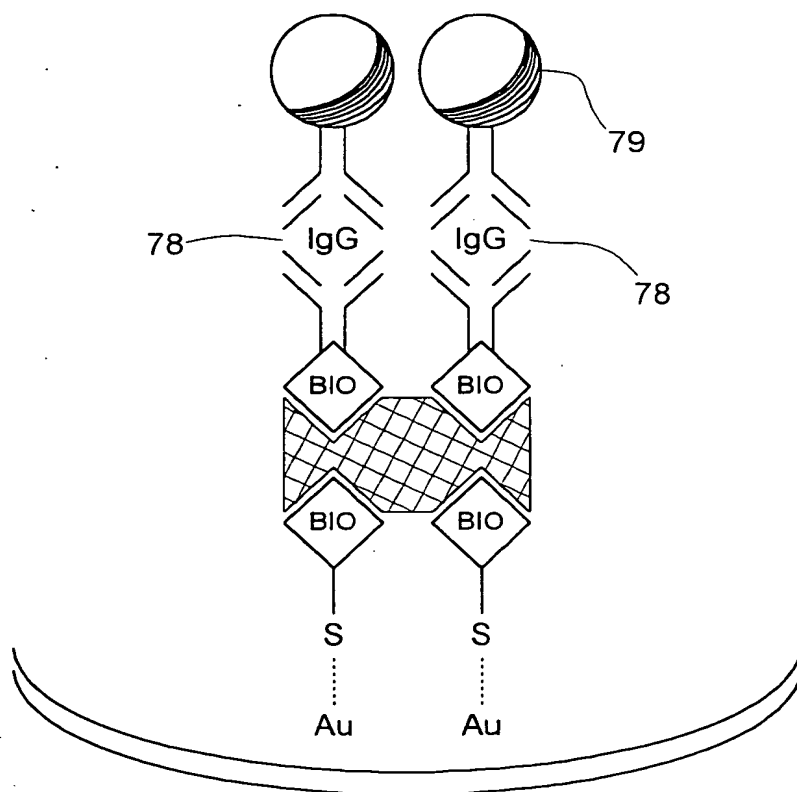


FIG. 7B

U.S. GOVERNMENT PRINTING OFFICE: 1964 O - 348-000

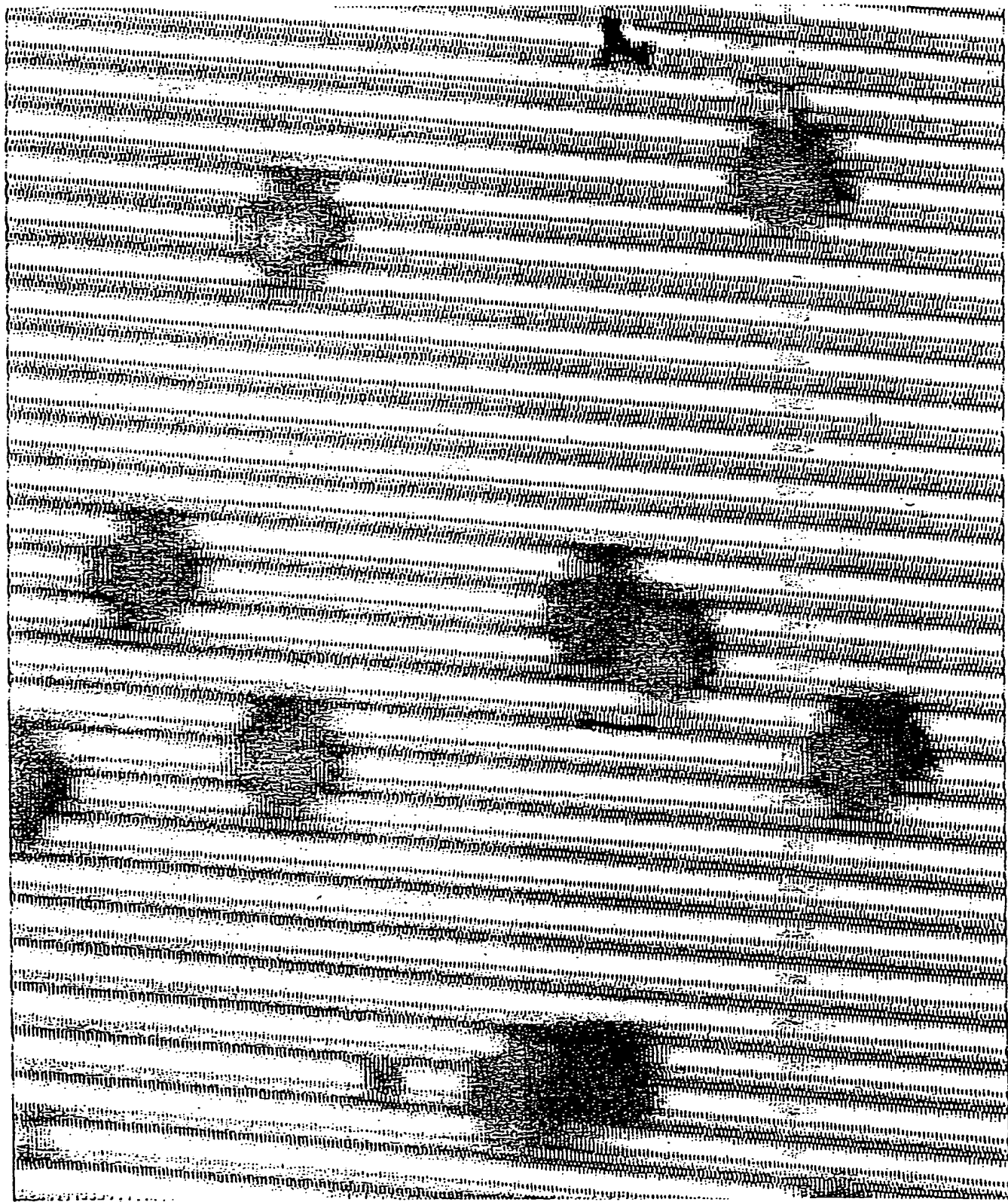
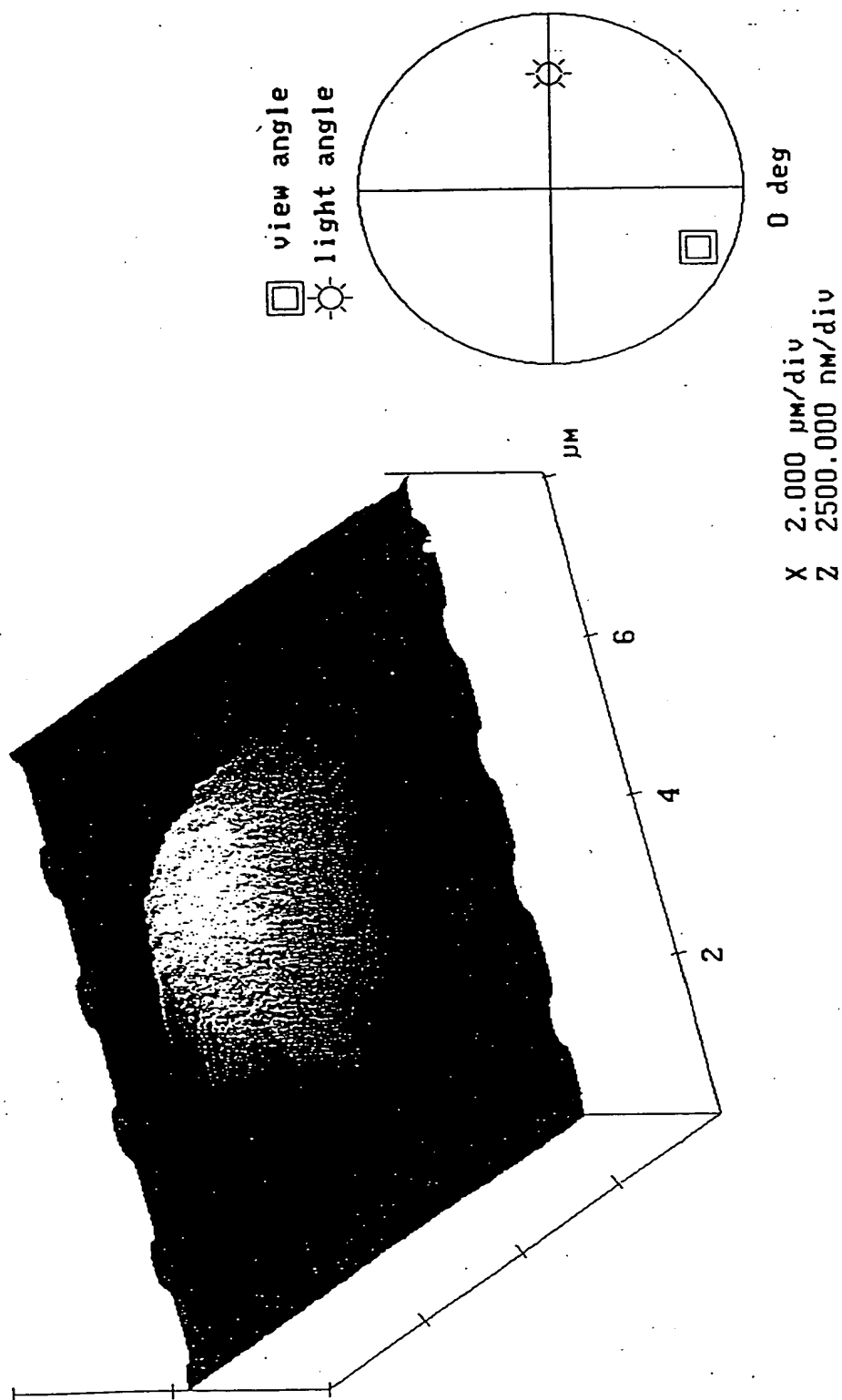


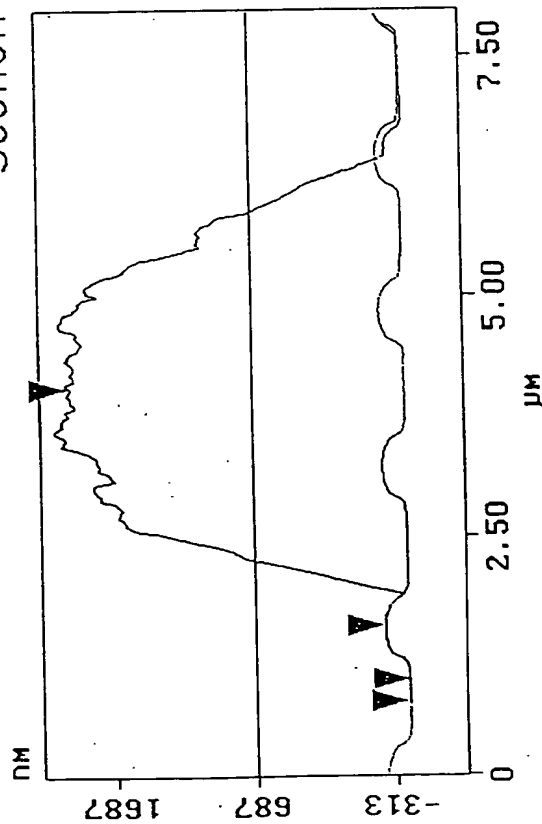
FIG. 8



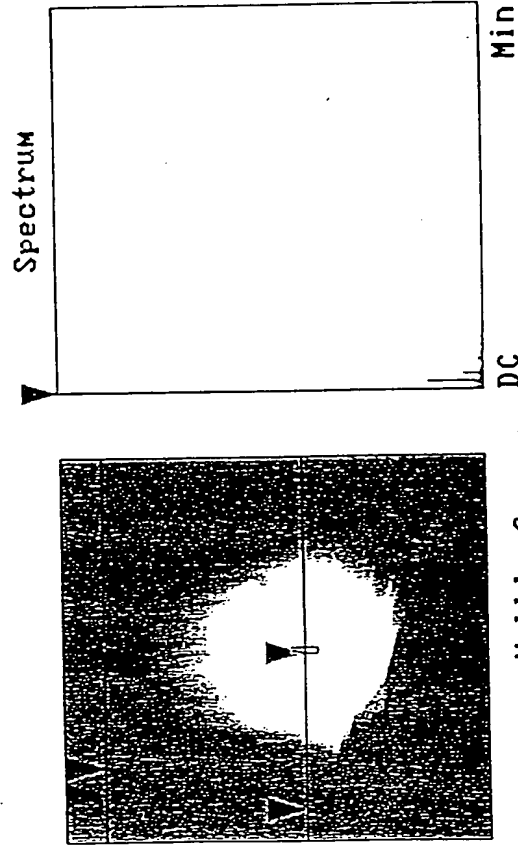
Sphere on Wobble Groove

1. The first part of the paper discusses the importance of the
 2. second part of the paper discusses the importance of the
 3. third part of the paper discusses the importance of the
 4. fourth part of the paper discusses the importance of the
 5. fifth part of the paper discusses the importance of the
 6. sixth part of the paper discusses the importance of the
 7. seventh part of the paper discusses the importance of the
 8. eighth part of the paper discusses the importance of the
 9. ninth part of the paper discusses the importance of the
 10. tenth part of the paper discusses the importance of the

Section Analysis



L	562.50 nm
RMS	72.881 nm
Ic	DC
Ra(Ic)	21.437 nm
Rmax	79.940 nm
Rz	66.462 nm
Rz Cnt	4
Radius	301.86 nm
Sigma	40.332 nm



Sphere on Wobble Groove
grating.013

Surface distance	631.28 nm
Horiz distance(L)	562.50 nm
Vert distance	171.70 nm
Angle	16.975 deg
Surface distance	5.531 μ m
Horiz distance	3.266 μ m
Vert distance	2.407 μ m
Angle	36.388 deg
Surface distance	
Horiz distance	
Vert distance	
Angle	
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	469.97 nm

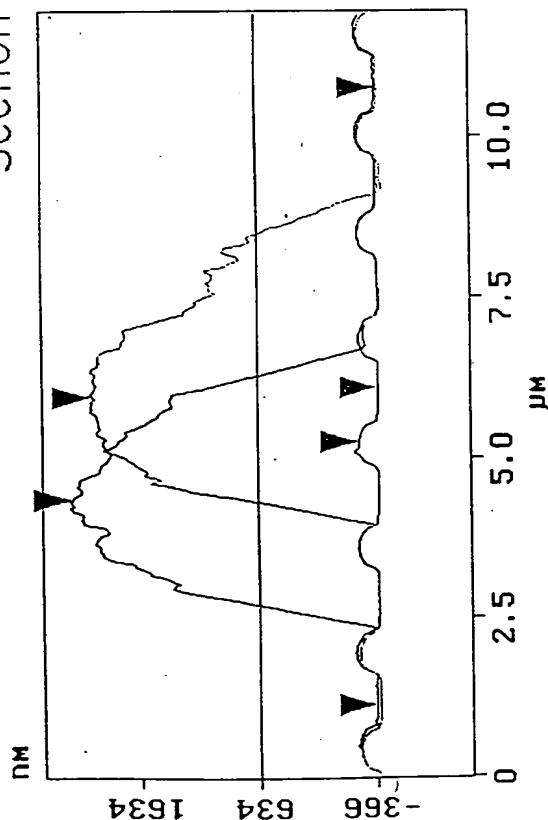
Cursor: fixed 2 Zoom: 2:1

Can Line: off offset: on

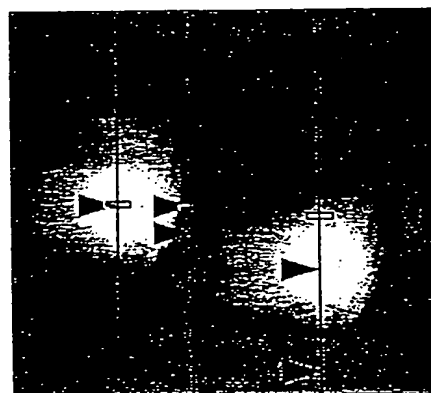
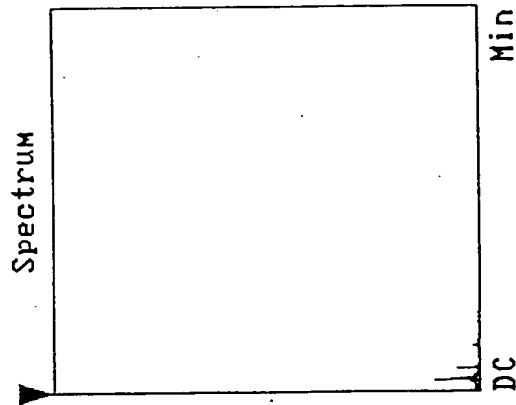
FIG. 10

Cursor	Marker	Spectrum Zoom	Center Line	Offset	Clear
--------	--------	---------------	-------------	--------	-------

Section Analysis



L	843.75 nm
RMS	63.849 nm
lc	DC
Ra(lc)	27.782 nm
Rmax	97.447 nm
Rz	96.754 nm
Rz Cnt 2	
Radius	450.61 nm
Sigma	62.095 nm



**Sphere on Wobble Groove
grating. 014**

Surface distance	6.867 μm
Horiz distance(L)	4.828 μm
Vert distance	2.445 μm
Angle	26.858 deg
Surface distance	894.27 nm
Horiz distance	843.75 nm
Vert distance	169.96 nm
Angle	11.389 deg
Surface distance	5.302 μm
Horiz distance	3.211 μm
Vert distance	2.568 μm
Angle	38.649 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	461.26 nm

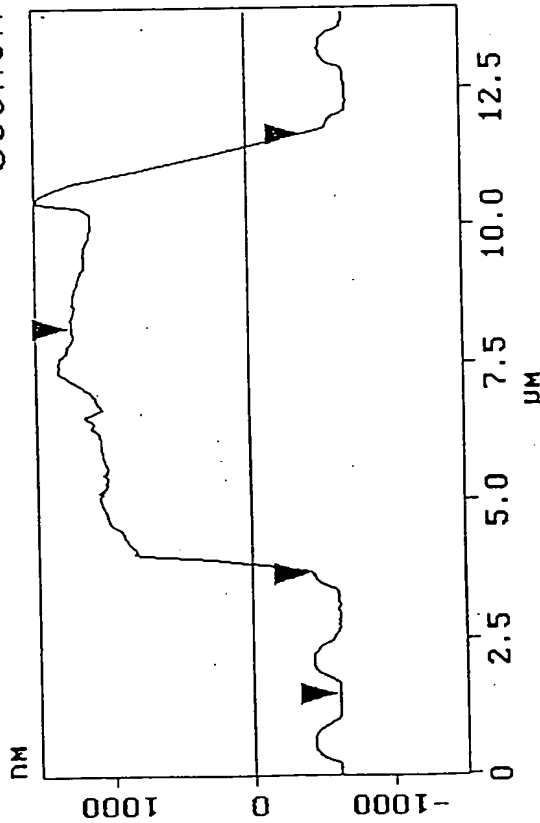
Cursor: fixed 3 Zoom: 2:1

cen line: off off: offset: on

FIG. 11

Cursor Marker Spectrum Zoom Center Line Offset Clear

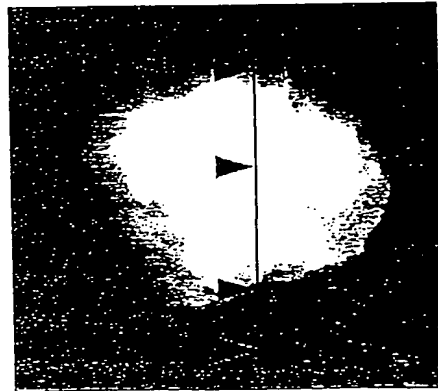
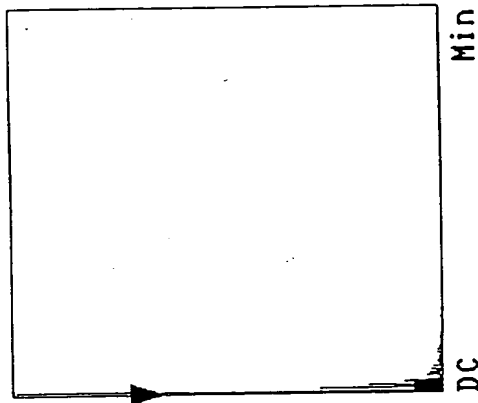
Section Analysis



L	6.672 μm
RMS	782.05 nm
lc	DC
Ra(lc)	284.31 nm
Rmax	1.187 μm
Rz	868.11 nm
Rz Cnt	4
Radius	3.512 μm
Sigma	426.35 nm

Surface distance	10.707 μm
Horiz distance(L)	7.984 μm
Vert distance	11.549 nm
Angle	0.083 deg
Surface distance	8.179 μm
Horiz distance	6.672 μm
Vert distance	1.860 μm
Angle	15.575 deg

Spectrum



Cells on Hubble Groove
grating.016

Cursor: fixed Zoom: 2:1 Cen line: Off Offset: Off

FIG. 12

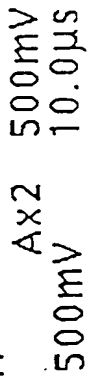
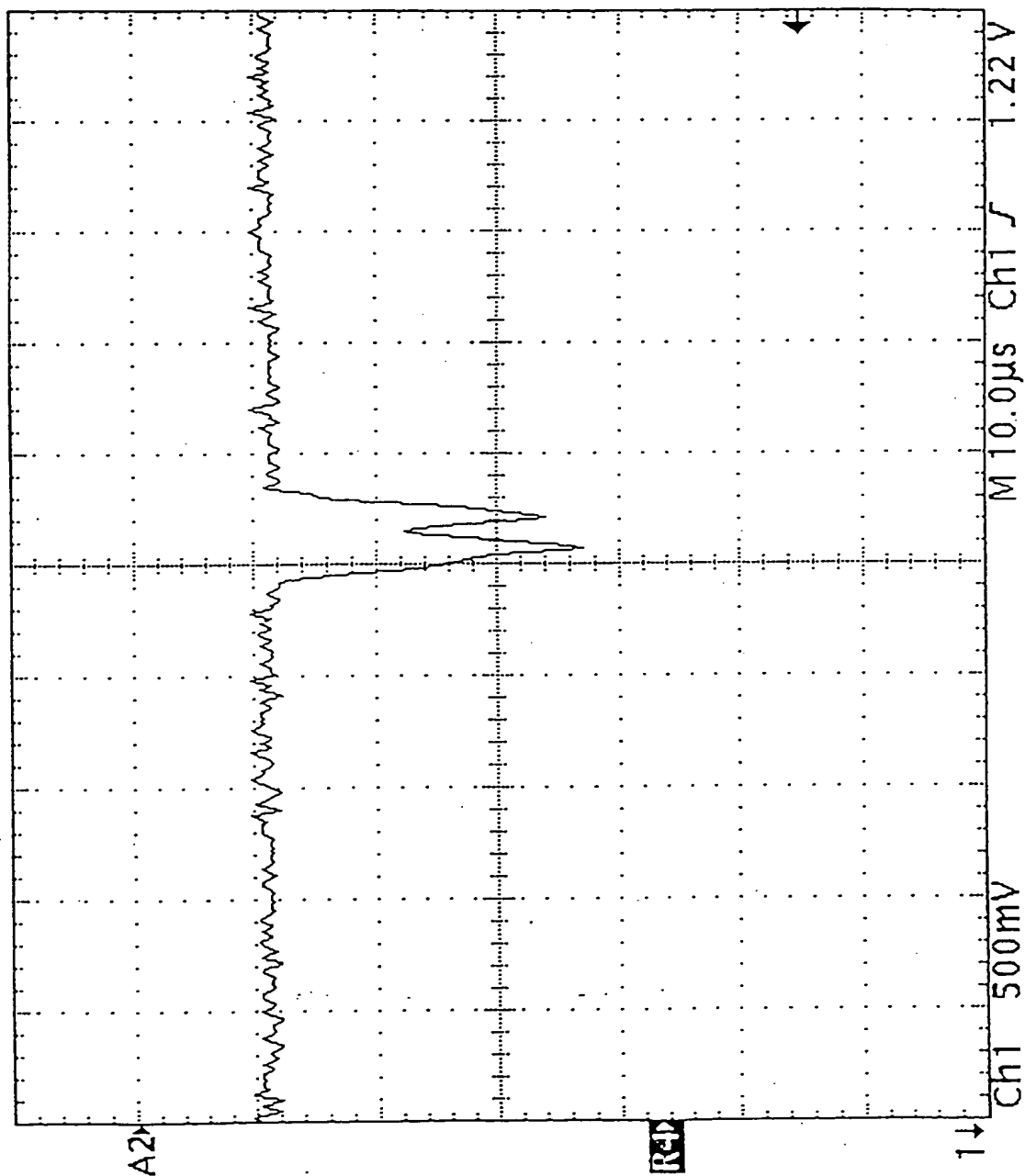


FIG. 13

0 Acqs



CMT 500mV
 Ax2 500mV
 10.0μs
 Ref4 500mV

FIG. 14.

TEKTRONIX
DIGITAL
SERIES
OSCILLOSCOPE

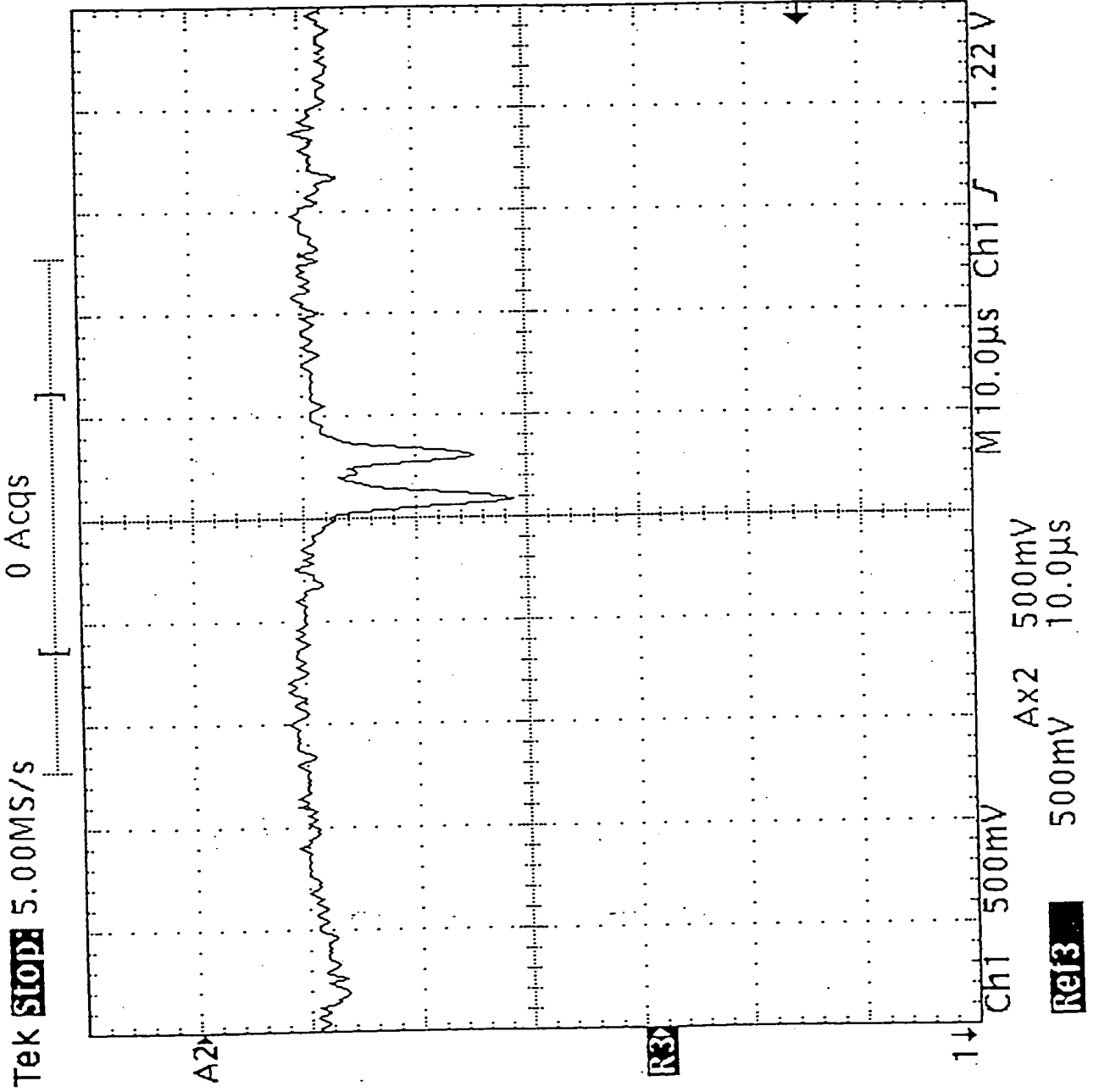


FIG. 15

1. The first step is to identify the problem or goal. This involves understanding the current situation and what needs to be achieved.

Tek Stop: 5.00MS/s

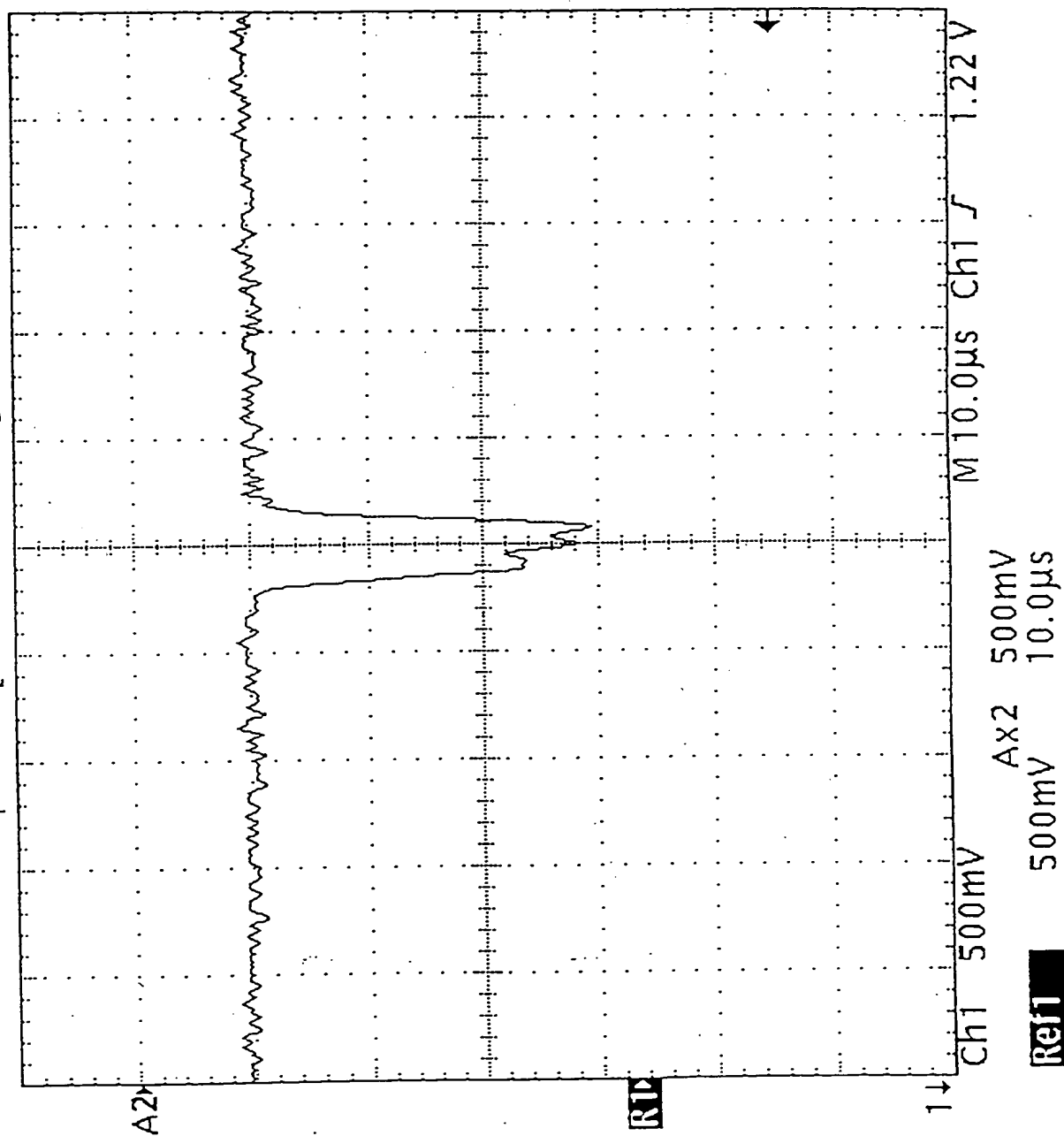


FIG. 16

TEKTRONIX CORPORATION
11000 DEER CREEK ROAD
DALLAS, TEXAS 75243-2111
TEL: 214/691-0100
FAX: 214/691-0101

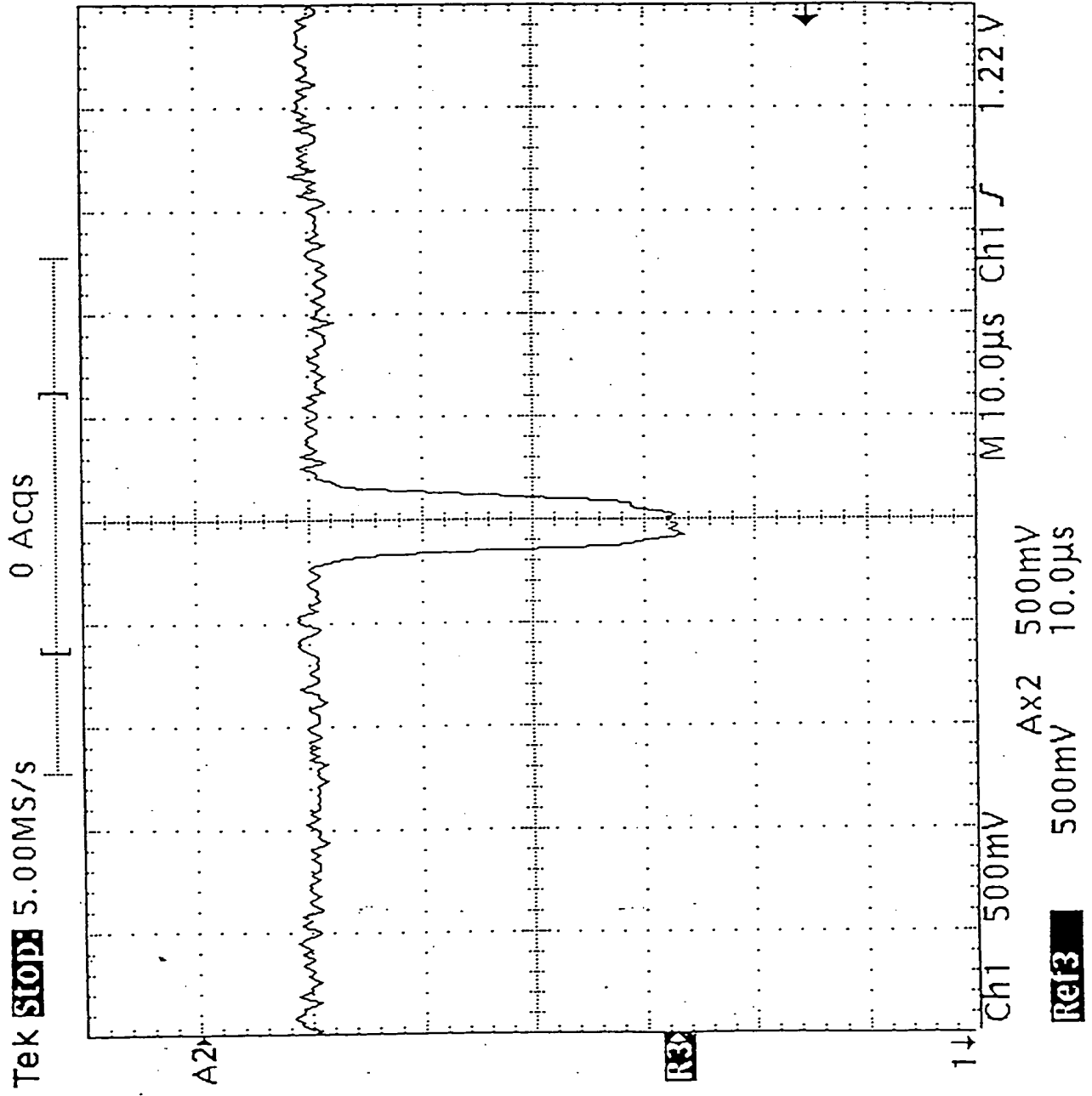
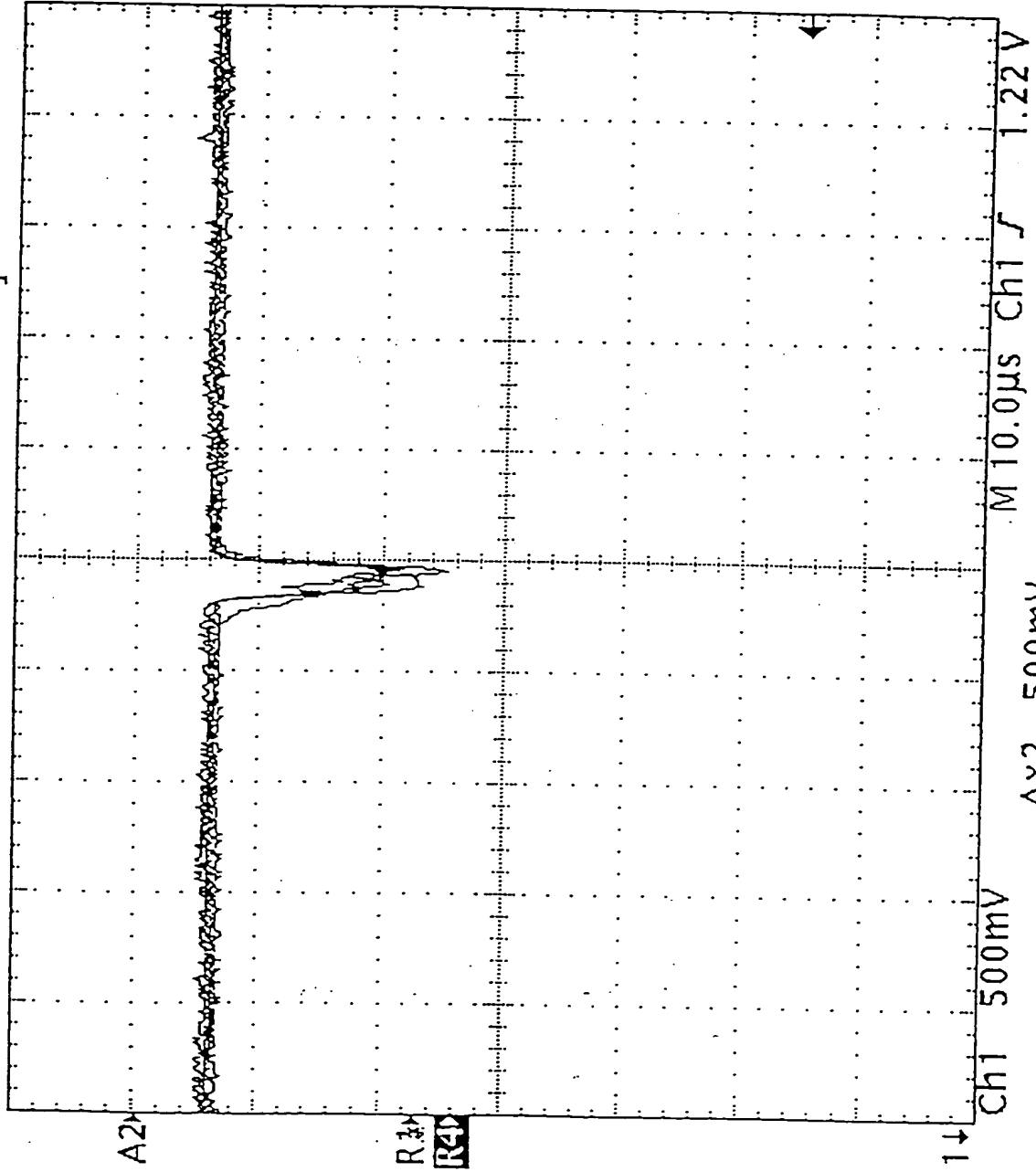


FIG. 17

Tek **Stop** 5.00MS/s

0 Acqs

[-----]



Ref4 BrstWd
5.68µs
Low signal
amplitude
Ref4 Pk-Pk
1.96 V

AX2 500mV
1.00 V 20.0µs

Ref4

FIG. 18

+

FIG. 19

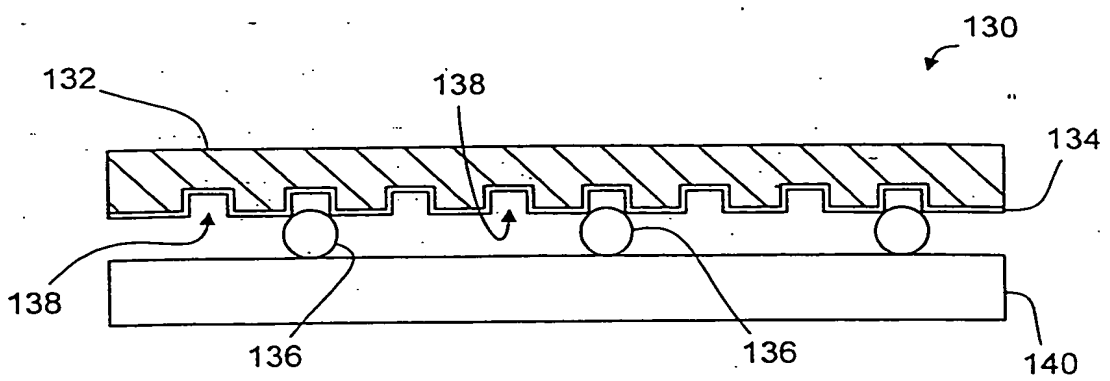


FIG. 20

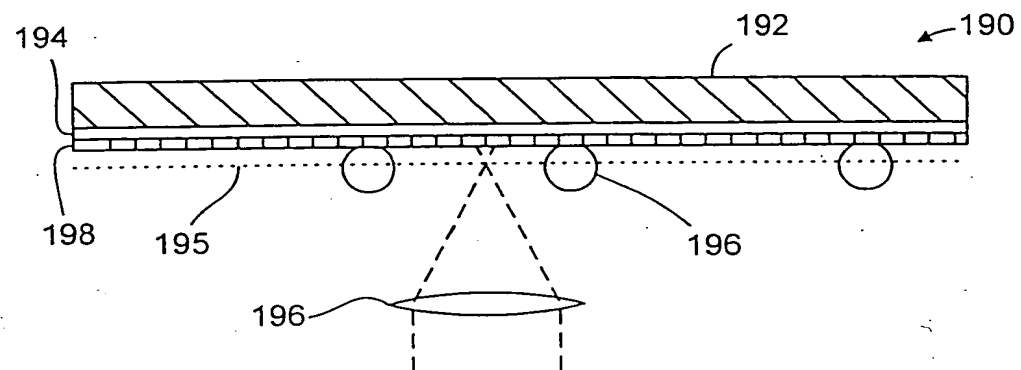
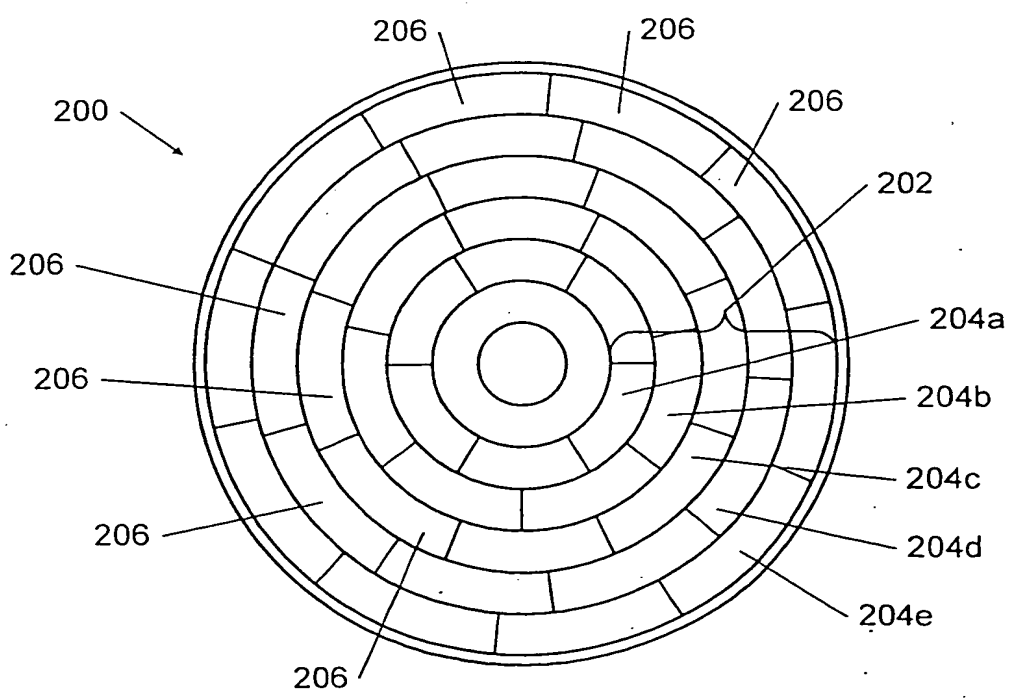


FIG. 21



+

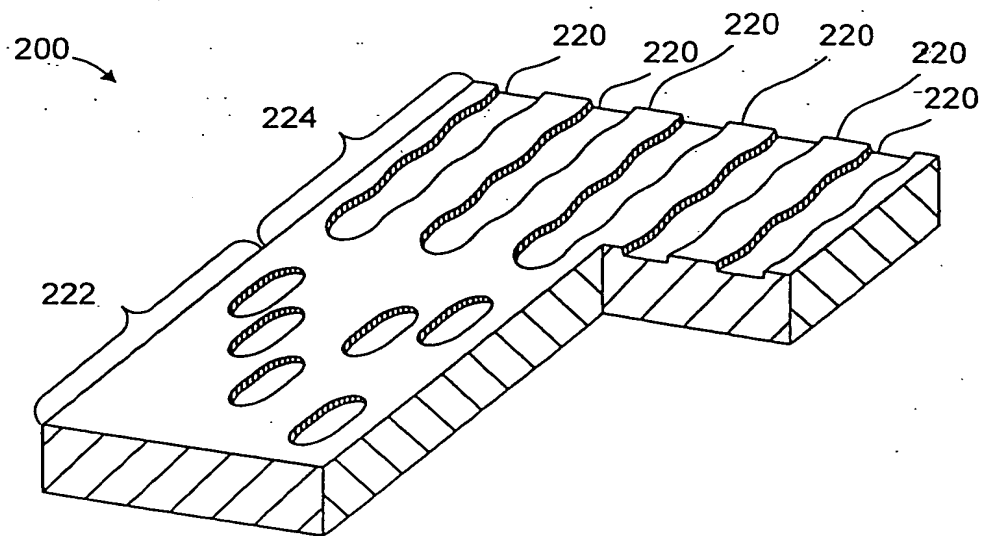


FIG. 22

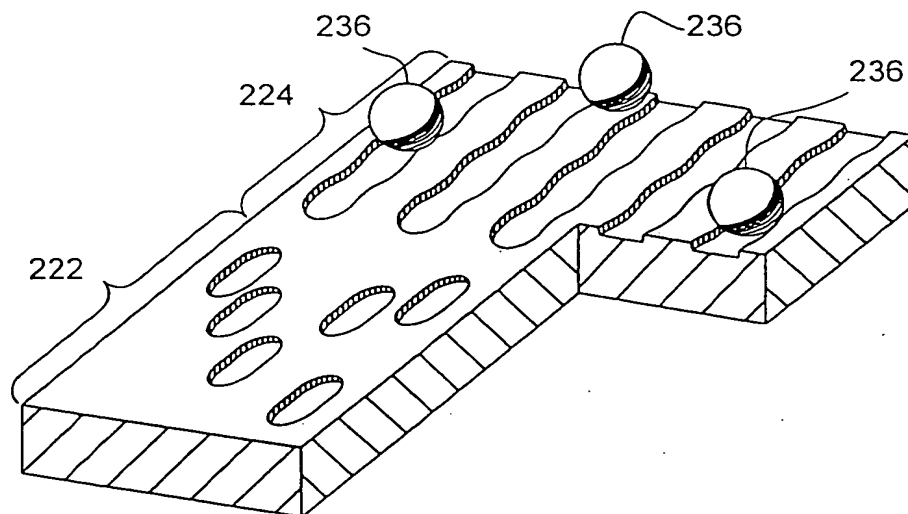


FIG. 23

+

280

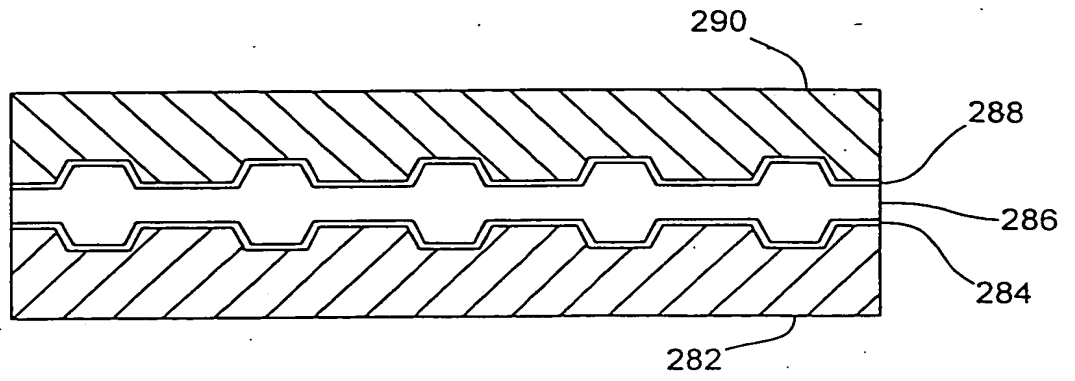


FIG. 24

300

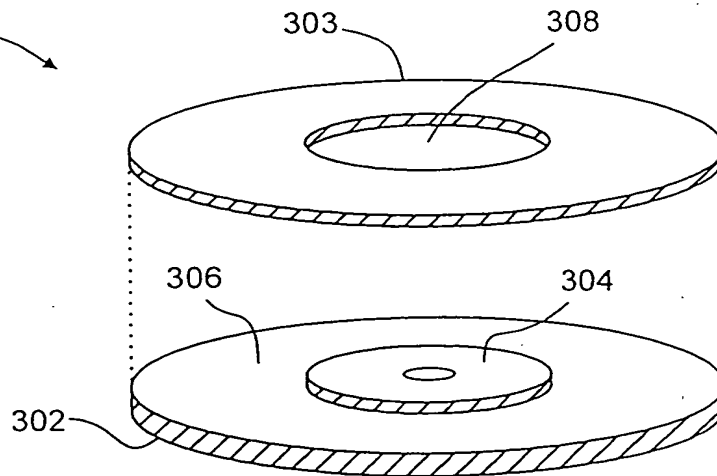


FIG. 25

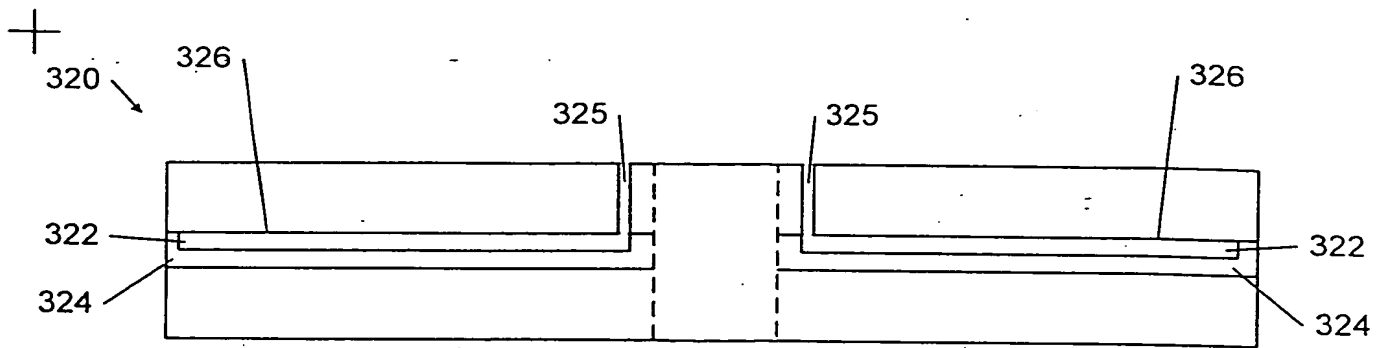


FIG. 26

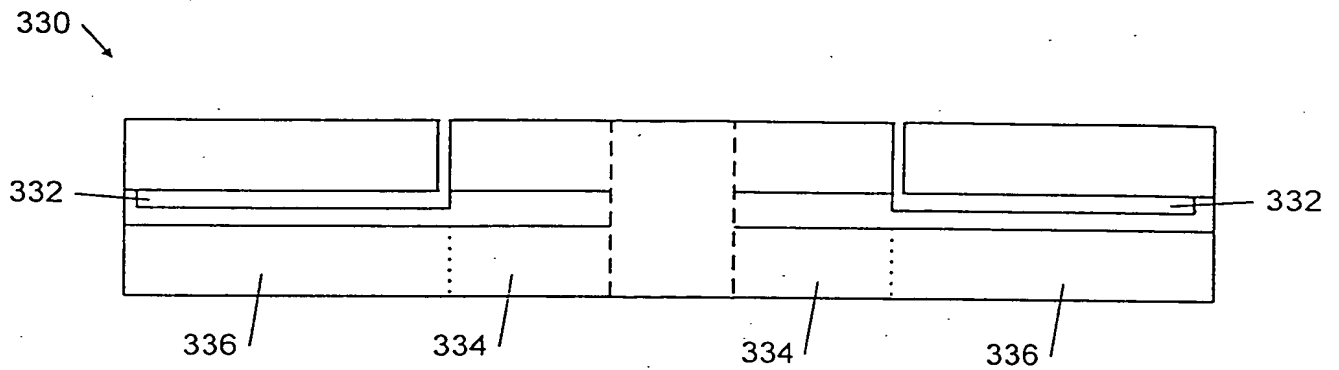


FIG. 27

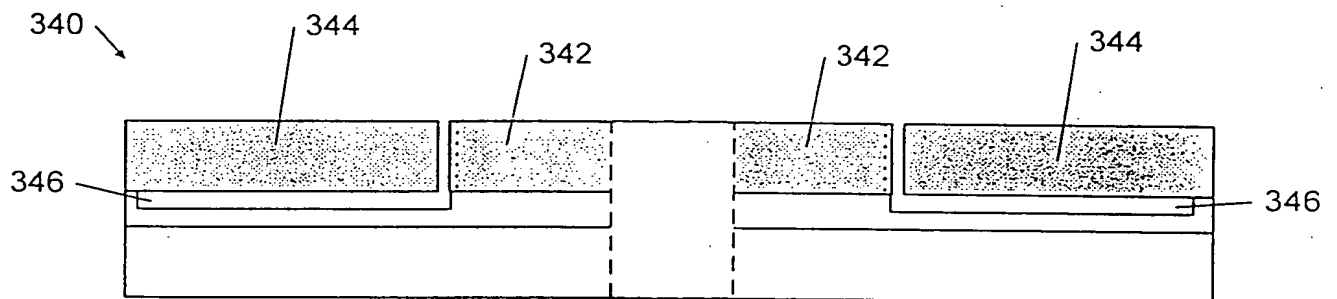


FIG. 28

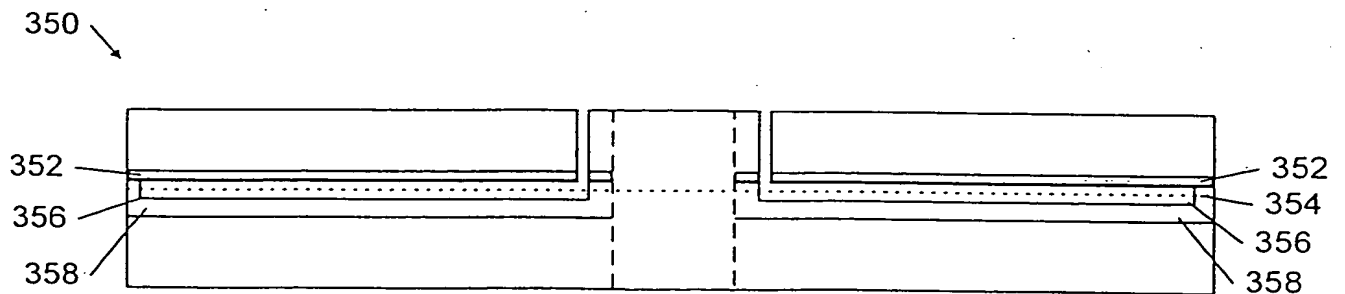


FIG. 29

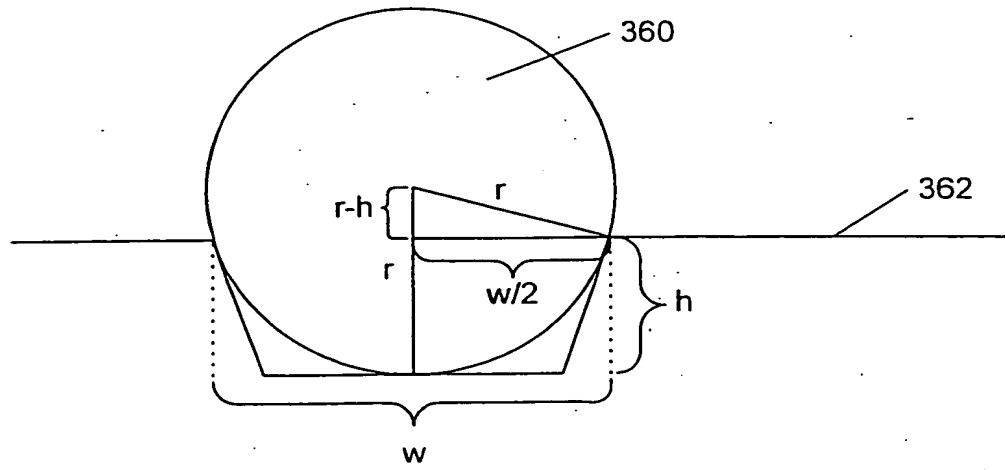
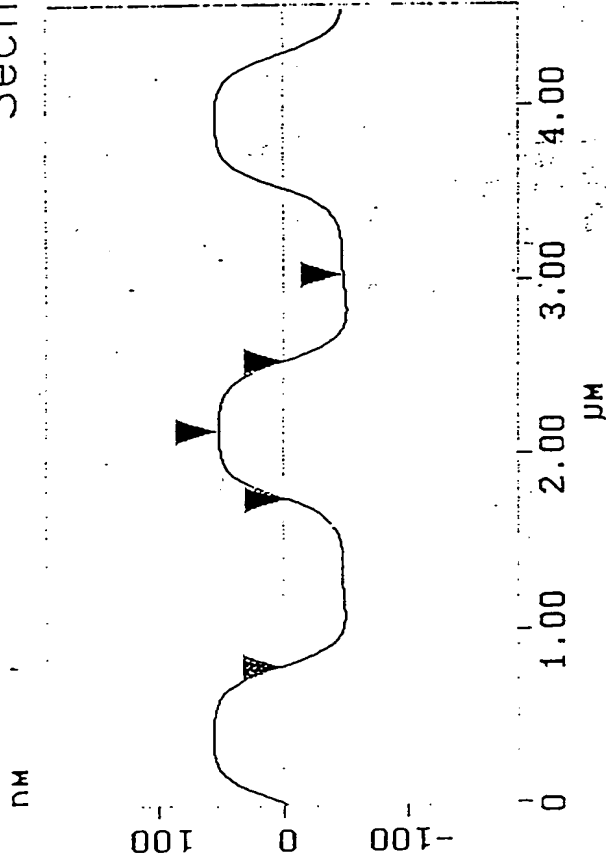


FIG. 30

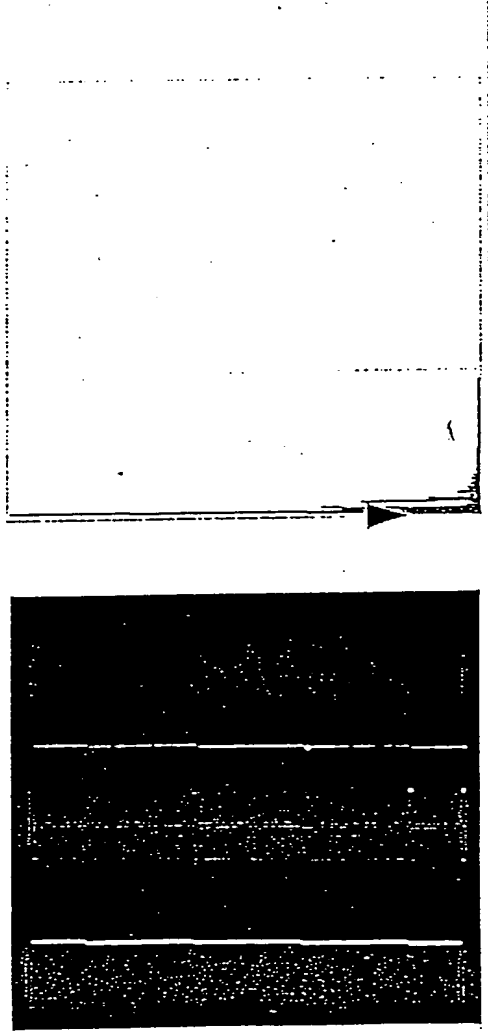
Cursor Marker Spectrum Zoom Center Line Offset Clear

Section Analysis



L	800.78 nm
RMS	17.366 nm
lc	DC
Ra(lc)	13.284 nm
Rmax	57.853 nm
Rz	57.853 nm
Rz Cnt 2	
Radius	1.427 μm
Sigma	4.388 nm

Spectrum



Surface distance	912.31 nm
Horiz distance(L)	898.44 nm
Vert distance	100.00 nm
Angle	6.351 deg
Surface distance	969.10 nm
Horiz distance	957.03 nm
Vert distance	7.528 nm
Angle	0.451 deg
Surface distance	817.07 nm
Horiz distance	800.78 nm
Vert distance	0.740 nm
Angle	0.053 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	4.523 nm

Fig. 31

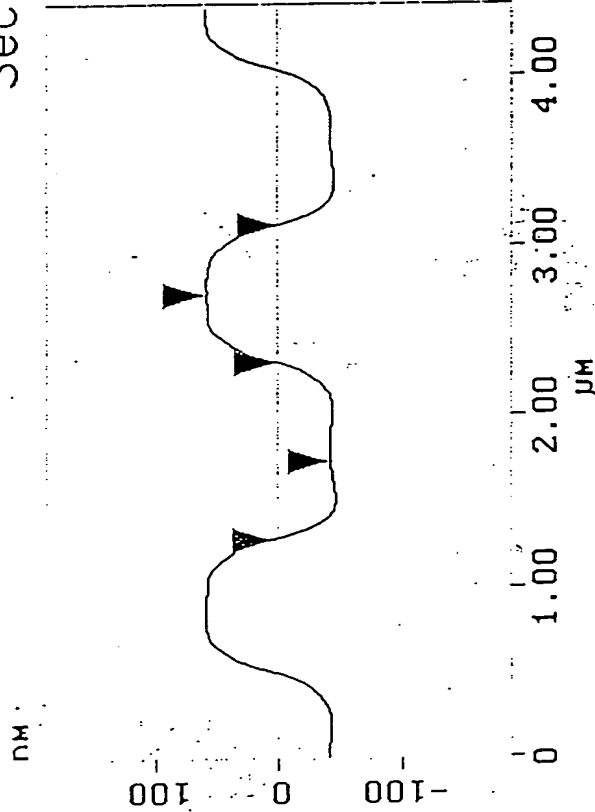
nm159in.000

Cursor: average Zoom: 2:1

: Off

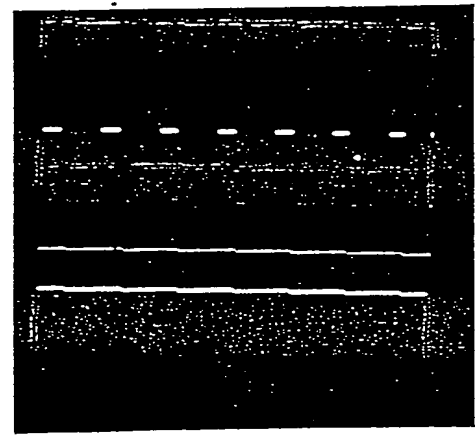
Cursor Marker Spectrum Zoom Center Line Offset Clear

Section Analysis



L	820.31 nm
RMS	18.016 nm
lc	DC
Ra(lc)	13.505 nm
Rmax	62.560 nm
Rz	61.145 nm
Rz Cnt 2	
Radius	1.431 μm
Sigma	5.174 nm

Spectrum



Surface distance	991.89 nm
Horiz distance(L)	976.56 nm
Vert distance	101.23 nm
Angle	5.918 deg
Surface distance	1.050 μm
Horiz distance	1.035 μm
Vert distance	7.648 μm
Angle	0.423 deg
Surface distance	840.65 nm
Horiz distance	820.31 nm
Vert distance	3.315 nm
Angle	0.232 deg
Spectral period	DC
Spectral freq	0 Hz
Spectral RMS amp	1.189 nm

rm159out.000

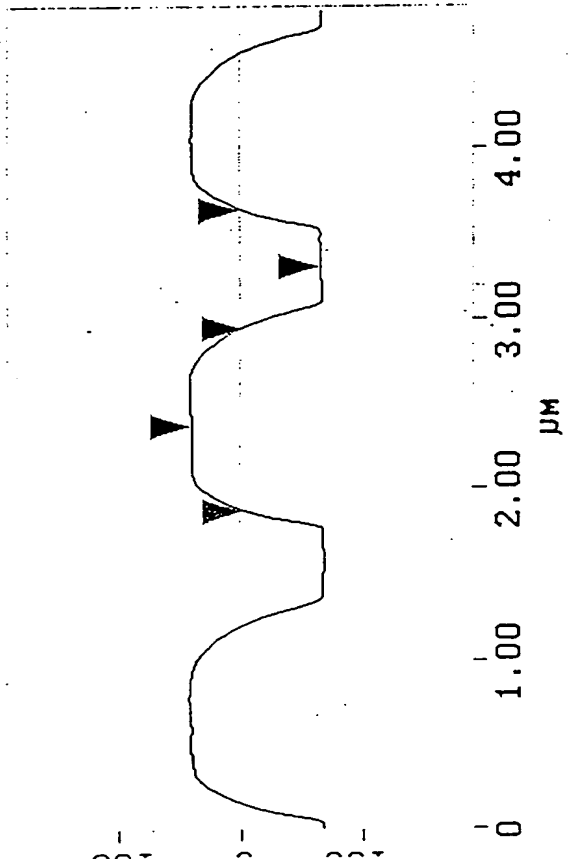
Cursor: average Zoom: 2:1

Fig. 32

fset: Off

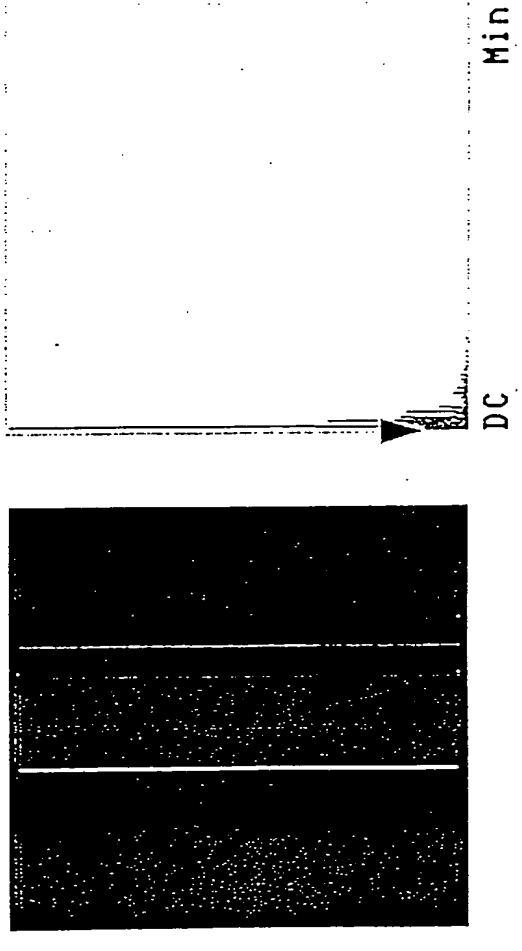
Section Analysis

nM



L	683.59	nM
RMS	21.794	nM
Lc	DC	
Ra(Lc)	16.951	nM
Rmax	67.772	nM
Rz	66.682	nM
Rz Cnt	2	
Radius	820.71	nM
Sigma	8.514	nM

Spectrum



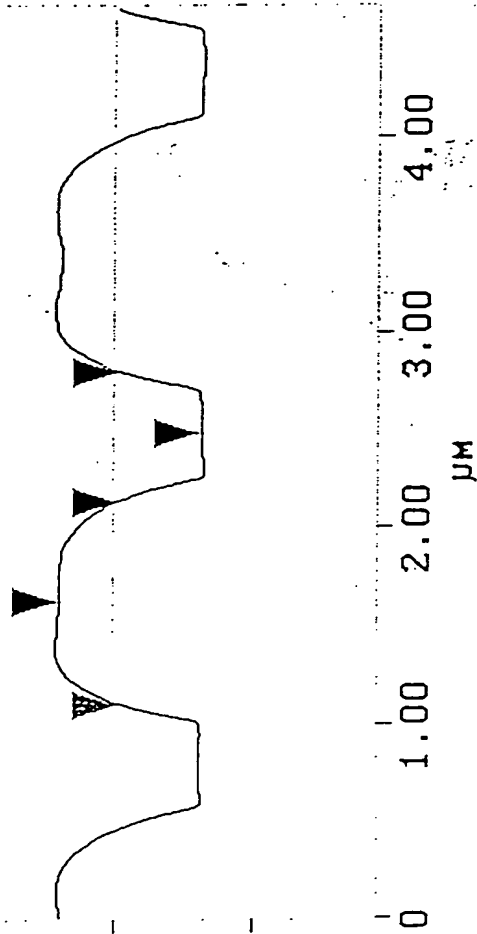
Surface distance	956.26	nM
Horiz distance(L)	937.50	nM
Vert distance	107.52	nM
Angle	6.543	deg
Surface distance	1.084	μm
Horiz distance	1.074	μm
Vert distance	4.127	nM
Angle	0.220	deg
Surface distance	715.65	nM
Horiz distance	683.59	nM
Vert distance	3.943	nM
Angle	0.330	deg
Spectral period	DC	
Spectral freq	0	Hz
Spectral RMS amp	3.603	nM

m160in.000

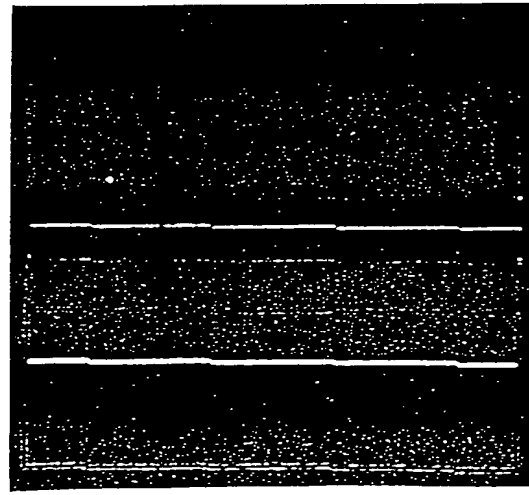
Fig. 33

Section Analysis

nm



Spectrum



DC

L	664.06	nm
RMS	20.135	nm
lc	DC	
Ra(lc)	14.972	nm
Rmax	66.116	nm
Rz	64.871	nm
Rz Cnt 2		
Radius	824.44	nm
Sigma	8.988	nm

Surface distance	878.62	nm
Horiz distance(L)	859.38	nm
Vert distance	102.80	nm
Angle	6.821	deg
Surface distance	1.046	μm
Horiz distance	1.035	μm
Vert distance	4.540	nm
Angle	0.251	deg
Surface distance	695.52	nm
Horiz distance	664.06	nm
Vert distance	2.814	nm
Angle	0.243	deg
Spectral period	DC	
Spectral freq	0	Hz
Spectral RMS amp	3.340	nm

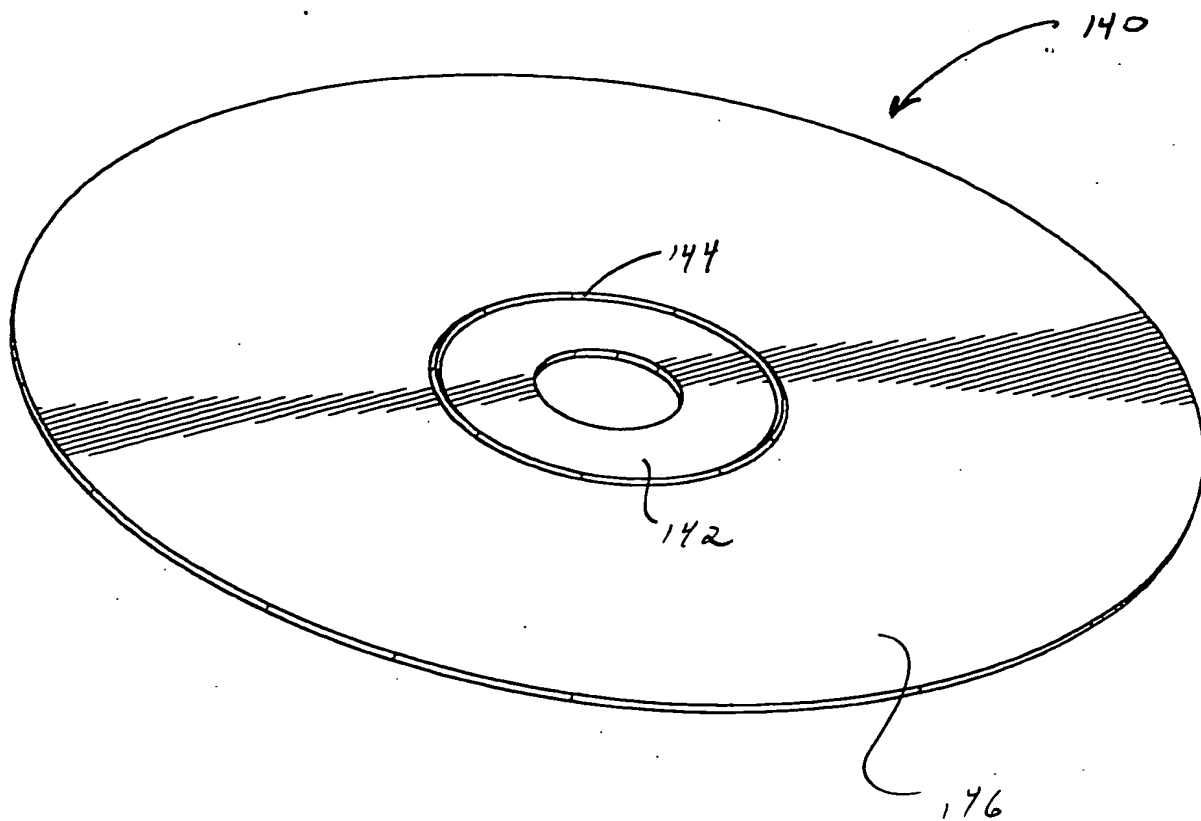


Fig. 35

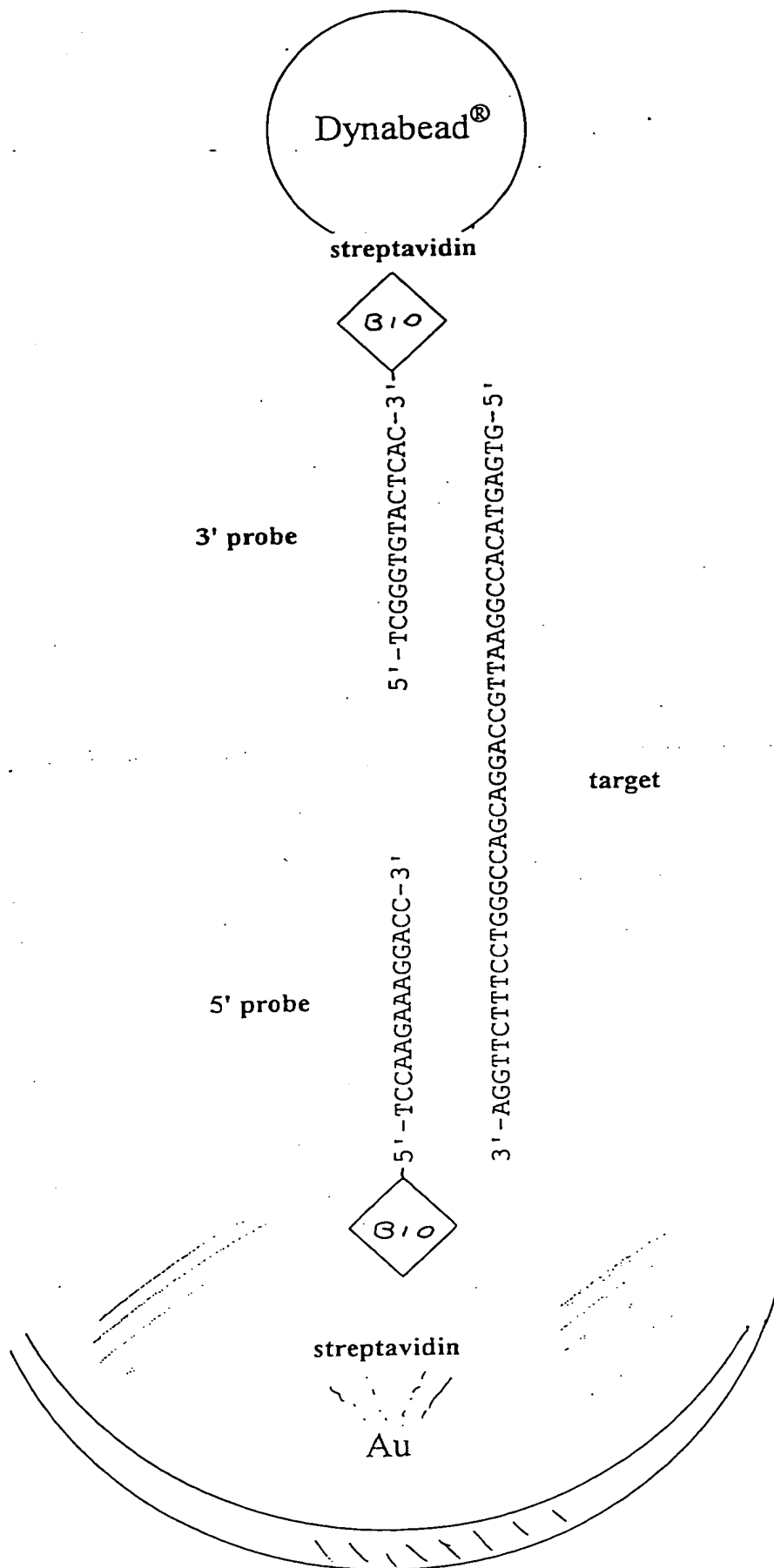
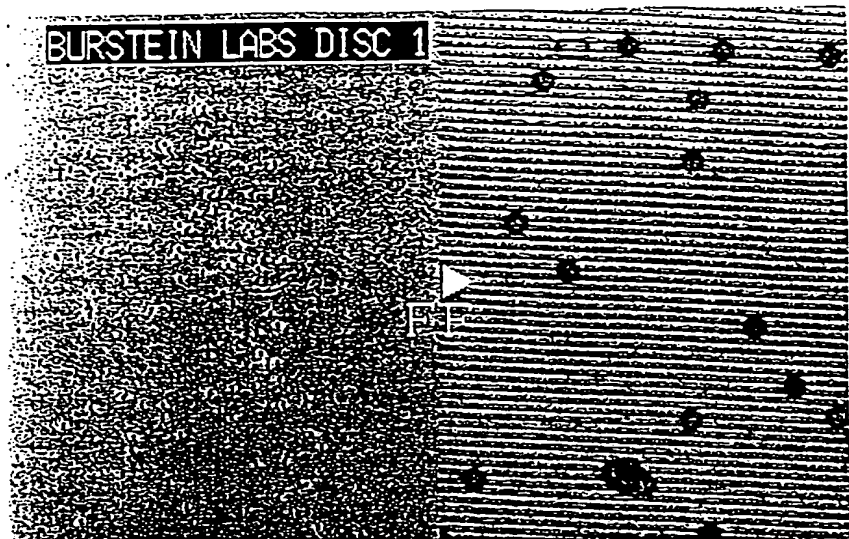
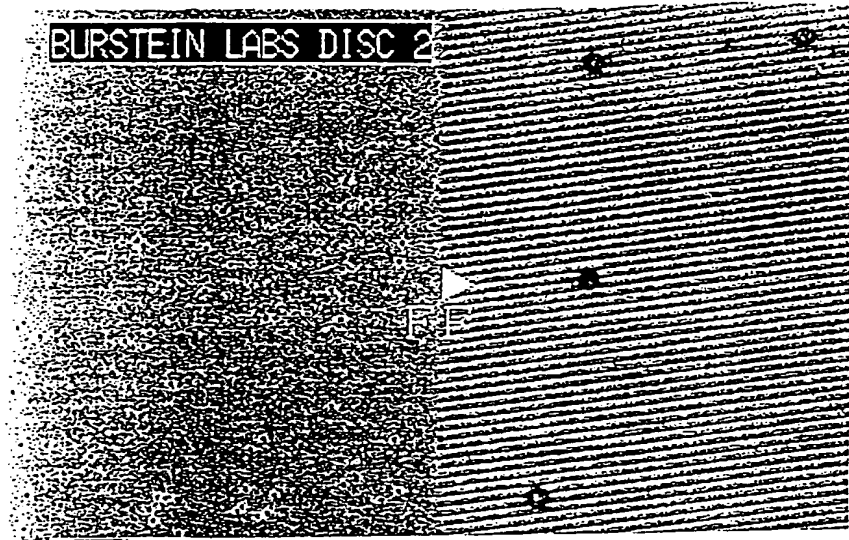


Fig. 36

A
20 femtomoles



B
20 attomoles



C
20 zeptomoles

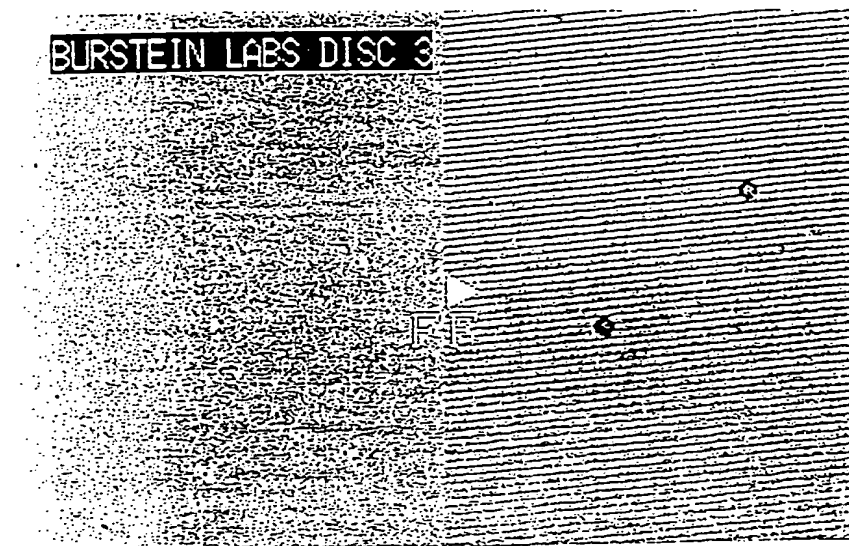


Fig. 37

0.55

Fig. 38



Fig. 39

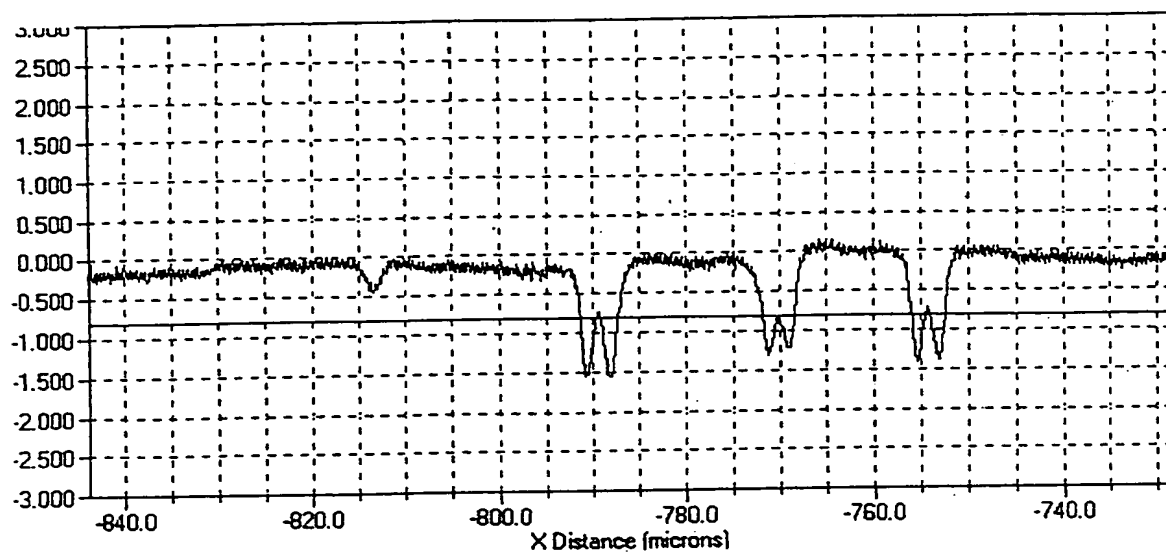


Fig. 40

AWM Muri Zusatzblatt Werkzeugabnahmetest CD-3-AWM

Auftrag Nr. 36-10225 Verw. CD-8 Stammerhalt. Werkz. Nr. 34 IFPI —
 SM Kom. Nr. 9N.96.283 Kunde Eximpro CS Stammer Dm. 34 WKZ Nr. 256

Abmessungen

0° = Werkzeug oben

Dicke 1.14 +0.03-0.02	0°	90°	180°	270°
R15	15,26	15,26	15,26	15,26
R40	15,26	15,26	15,26	15,26
Mittelloch 15.05 +/- 0.03	15,05	Dm. 120 +/- 0.3		

Gewicht in g Min.
 Während Test alle 9
 15 Min. messen 9
 max. diff. +/- 0.1 g

0	15	30	45	60
15,26	15,26	15,26	15,26	15,26
15,26	15,26	15,26	15,26	15,26

Wasser im Werkzeug
 Angussbuchse
 Stanzer

IST	Illr./ Min.	SOLL	Tol.
9	7	7	-1/+3
6	7	7	-1/+3

Vakuum
 Handling
 Stamper

ohne	mit	diff.	Tol.

Werkzeugfunktion

Stanzer
 Angussauswerfer
 Auswerferhülse
 Angussbuchse

✓
✓
✓
✓

X

Rohmaterial
 Makrolon 2005
 Lexan 1020
 Panlite 5503

Luftaustritt
 FS Dm. 22
 BS Dm. 20

✓
✓

Visuelle Fehler

Schlieren	1/4	Mittelloch	OK
✓	1/4	Stapelhut	OK
✓	1/4	Info	OK
✓	1/2		OK
✓	1		OK
✓	3		OK
✓	3		OK
✓	3	Mittelloch	OK
✓	3	Aussenrand	OK
✓	3		OK
✓	3		OK
✓	5		OK

Wolken
 Lunker
 Schwarze Punkte
 Aussenrand matt
 Grat
 Kratzer
 Dieseleffekt
 Braun verfärbt

Werkzeugmasse kalt

Dicke Kavität (3)	1462
Entlüftungsspal (5)	1033
Position Stanzer (9)	0,876
Position Angussbuchse (10)	0,162
Stanzhub	0,7

Messmittel

Polarisiertes Licht 1
 Halogenlicht 2
 Neonlicht 3
 Schwarzes Licht 4
 Weisses Papier 5
 Mikrometer 6
 Waage 7

Erstellt durch: hby

Fig. 41A

Graphik 1. Einspritzen - Nachdruck

Dargestellter Zyklus 533957
Kurvenanzeige laufend

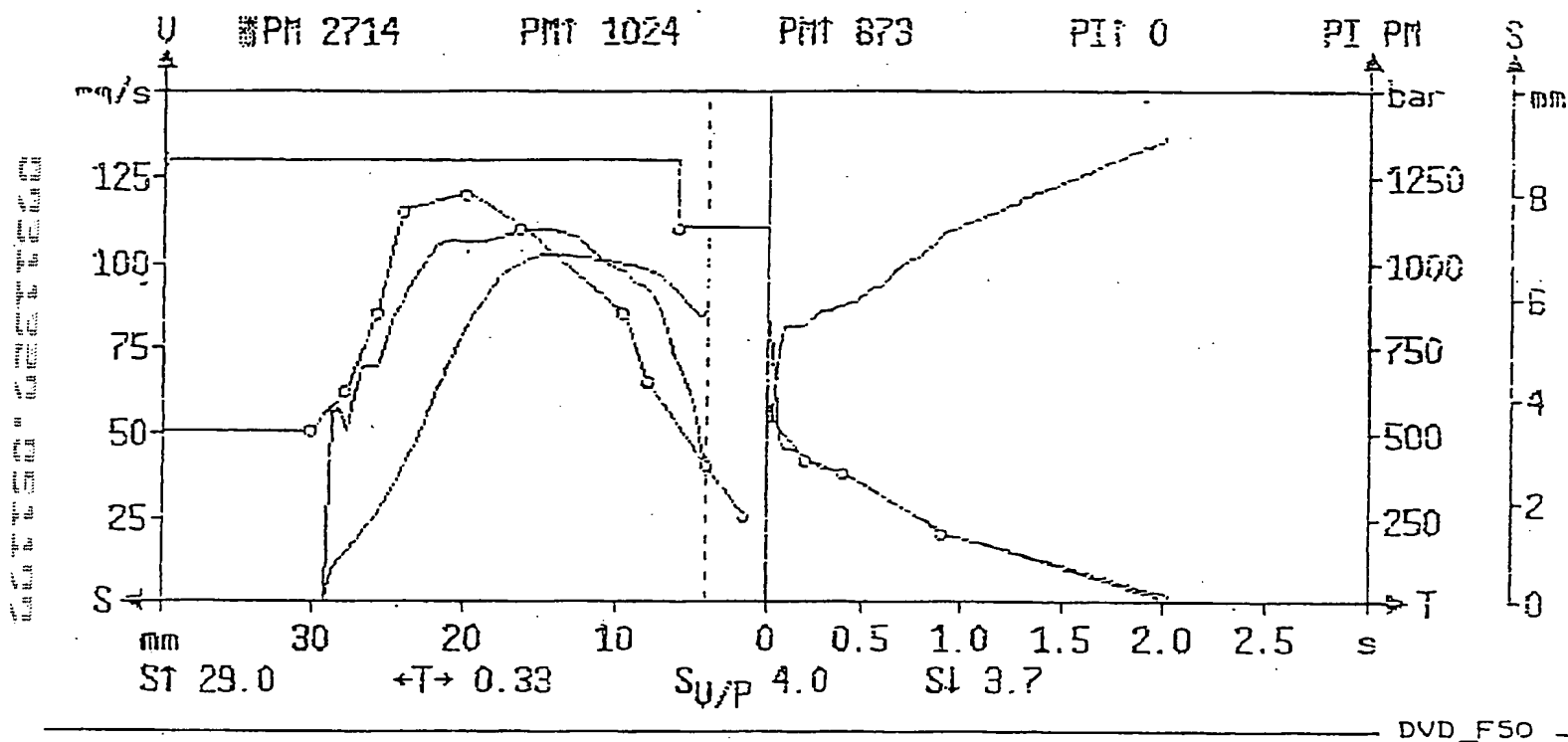


Fig. 41B

01.01 Werkzeugbewegung

Schliessbewegung		Schliesszeit	T32 = 000.16
Druckauslösung	V33 = 100 % V34 = 010 %	S33 = 019.0 mm S34 = 000.7 mm	
Öffnungsbewegung		Öffnungszeit	T36 = 000.20
4 Bremsen	V41 = 100 % V42 = 010 %	S41 = 055.0 mm	
Pausenzeit	T40 = 000.00 s	Formposition	S640 = 075.3
Formschlussdrücke			
Schliessdruck	P682 = 085 %		
Druckabbau	P681 = 020 %	T681 = 000.10 s	
	C608 = 0 Ausgeschaltet		

DVD_FS

02.01 Übersicht Werkzeughilfesteuern / Robotik

Freigabe Entnahme S680 = 0065.0 mm

Verzögerungen

Anguss abblasen	T602 = 000.03 s	Blaszeit Anguss	T603 = 000.10
Ausstosser-Stift vor	T53 = 000.10 s		
Übergabehub vor	T55 = 000.12 s		
Übergabehub ret.	T56 = 000.15 s	Entnahme ausfahren	T668 = 000.20
Stanzer vor	T62 = 001.20 s	Stanzer retour	T63 = 000.15
Blasen Düsenseite	T75 = 000.50 s	Blaszeit Düsenseite	T74 = 000.80
Blasen Bew.Seite	T671 = 000.00 s	Blaszeit Bew.Seite	T71 = 000.15
Aggregat vor	T680 = 000.70 s		

fahrprogramm	C683 = 00000	T683 = 000.00 s	S683 = 0004.4
Zykluszeit	T11 = 009.05 s		
Entnahmezeit	T640 = 000.70 s		

Fig. 41C

03.01 Dosieren

Schneckenrückzug C17 = 0 Ausgeschaltet •

Dosieren Dosierzeit T21 = 005.98 s
Verzögerung T20 = 000.50 s
Dosierstufen C124 = 2

Dosierendpunkt S23 = 026.0 mm P23 = 0060 bar N23 = 100 1/m³
S24 = 029.0 mm P24 = 0010 bar N24 = 020 1/m³

Halteindruck P27 = 0010 bar Start Einspritzen SO = 029.0 mm

DVD_F50

04.01 Einspritzen

Freig. Einspritzen S682 = 0002.0 mm Schneckenposition S641 = 029.0 mm

Einspritzwerte C121 = 10 Start Einspritzen SO = 029.0 mm
V196 = 0050 mm/s S196 = 030.0 mm
V197 = 0062 mm/s S197 = 027.6 mm
V198 = 0085 mm/s S198 = 025.6 mm
V199 = 0115 mm/s S199 = 024.0 mm
V200 = 0120 mm/s S200 = 019.8 mm
V201 = 0110 mm/s S201 = 016.2 mm
V202 = 0085 mm/s S202 = 009.5 mm
V203 = 0065 mm/s S203 = 008.0 mm
Freigabe V/P-Umsch. V204 = 0040 mm/s S204 = 004.0 mm
Zwangsumschaltung V205 = 0025 mm/s S205 = 001.5 mm
V/P-Umschaltpunkt T2 = 000.33 s
S11 = 004.0 mm

Fließzahl S121 = 018.2 mm S122 = 015.0 mm C125 = 2776
Rücküberwachung Spitzendruck P125 = 01044 bar
Erste Stufe P101 = 01300 bar T201 = 00.02 s
Zweite Stufe P102 = 01100 bar T202 = 00.02 s S102 = 006.0 mm

Fig. 41D

04.02 Nachdruck, Kühlen

Nachdruckwerte	C122 = 04 P12 = 00550 bar	Umschaltpunkt	S11 = 004.0 mm
	P117 = 00420 bar P118 = 00380 bar P119 = 00200 bar	T117 = 000.20 s T118 = 000.40 s T119 = 000.90 s T120 = 002.00 s	
Nachdruckzeit	T39 = 005.30 s		
Kühlzeit			
Massepolsterüberwachung		Massepolster	S19 = 003.7 mm
Obere Grenze	S219 = 010.0 mm	Untere Grenze	S119 = 000.5 mm

DVD_F50

05.01 Düsen, Aggregat, Aus-/Leerspritzen

Stillstandsüberw.	C606 = 60 min	C640 = 0004 min	
Aggregat			
Aggregat vor	T680 = 000.70 s	V29 = 030 %	
Abheben	T30 = 000.30 s	V30 = 050 %	
Aggregat Einricht- und Handbewegungen			
Vorfahren	V816 = 030 %	Abheben	V806 = 030 %
Aus - / Leerspritzen / Reinigen			
Zahl Dosierhübe	C16 = 20	C201 = 50	
Dosieren	S16 = 028.0 mm	P16 = 0060 bar	N16 = 200 1/mm
Spritzen	S18 = 001.5 mm	V101 = 05 mm/s	
Verzög. Ausspritzen	T606 = 000.00 s		

Fig. 41E

06.01 Temperaturregelung Plastzonen / Temperiergeräte

Zone / Bezeichnung	Sollwert THxx	Istwert TH1xx	Reduziert TH2xx	Toleranz		Heizleistungen TH5xx	Kühlleistungen TH6xx
				minus	plus		
10 Massetemperatur	310 °C	305 °C	180 °C	040 °C	040 °C		
10 Düse	330 °C	330 °C	180 °C		040 °C	014 %	
13 Düse	315 °C	315 °C	180 °C	040 °C	040 °C	025 %	
14 Zylinderkopf	310 °C	310 °C	180 °C	040 °C	040 °C	008 %	
15 Kompression	305 °C	305 °C	180 °C	040 °C	040 °C	005 %	
16 Kompression	305 °C	308 °C	180 °C	040 °C	040 °C	006 %	
18 Einzug	300 °C	295 °C	180 °C	040 °C	040 °C	070 %	
20 Einlauf	060 °C	060 °C	060 °C	040 °C	040 °C		024 %
Zone / Bezeichnung	Sollwert THxx	Istwert TH1xx	Reduziert TH2xx	Toleranz		Heizleistungen TH5xx	Kühlleistungen TH6xx
				minus	plus		
24 H-K Gerät	112 °C	093 °C	050 °C	020 °C	020 °C	000 %	000 %
25 H-K Gerät	114 °C	091 °C	050 °C	040 °C	020 °C	000 %	000 %

DVD_F50

08.01 Disc - Übergabe

Interface PeripherieC684 = 0 Ohne Signalquittierung

Abschaltgr. Puffer C680 = 65000

Produktionsverzög. T682 = 001.00 s C605 = 0 Mit Zyklusunterbruch

Max.Transferzeit T601 = 001.00 s

Fig. 41F

09.01 Produktionssteuerung

Auftrag C330 = 0 ohne Auftrag

Datensatznummer C315 = 100

Produktionsablauf

Fachzahl C303 = 1

Stückzähler C324 = 29270

Zykluszähler C325 = 29270

Zykluszeit T11 = 009.05 s Fehlquote C718 = 30.56 %

Produktionsvorbereitung Grund C357 = 00

DVD_F50

10.01 Prozess-Statistik

Q-Überwachung C340 = 2 Überwachung ohne Aussortieren

Q-Report C700 = 0 kein Report

	Zyklen	davon	ausser Toleranz	Fehlquote
Gesamt	C325 = 29270		C318 = 8946	C718 = 30.56 %
Stichprobe	C326 = 29269		C338 = 8946	C738 = 30.56 %

Prozessgrössen	Sollwert	Toleranz	Istwert	Mittel	Streuung	ausser Toleranz
	x	+/-	x	xq	3s	
Dosierzeit	1.20	0.30	5.98 s	2.32	5.408	-06786
Einspritzstart	30.1	2.0	29.0 mm	28.6	0.82	2028
Einspritzzeit	0.47	0.20	0.33 s	0.39	0.105	0
V/P-Umschaltzeit	3.5	1.0	4.0 mm	4.0	0.04	0
Massepolster	4.2	1.0	3.7 mm	3.8	0.25	0
1. Spitzenwert	600	200	871 bar	682	99.9	-06566
2. Spitzenwert	0		0 bar	0	0.0	
Fliesszahl	2500	300	2776	2441	99.9	359
Zykluszeit	3.90	0.50	9.05 s	5.08	6.421	-06570

Fig. 41G

10.02 Konfiguration der Q-Überwachung

Reaktion: Prozessdaten ausserhalb der Toleranz
Abschaltverhalten C703 = 0 keine Reaktion

DVD_F50

10.03 Zwischenspeicher Q-Report

Hersteller
Maschinen Nr. DVD_F50
Auftragsdaten

Fig. 41H

DVD_F50

16.01 Systemkenndaten

Maschinendaten

Maschinen-Typ DISCJET 600/110
Steuerungsversion PAC 13.54
Datenbankversion DB 05.08
Sonder 350400

Kommissionsnummer
IMC 12.26
Erstellungsdatum
Version

DVD_F50
CEL 10.31
23.10.1996
17106

Werkzeugdaten

Einbauhöhe S90 = 160.0 mm

Plastifizierung

SN-Durchmesser Identifikation
Max.zul.Massedruck S801 = 032.0 mm
Max.zul.Staudruck P800 = 01482 bar
P801 = 0317 bar

C806 = 024

Max. Dosierhub

Max.spez.Massedruck

C804 = 0024

S802 = 100.0 mm

P802 = 01482 bar

Temperaturen

Schrank
öl

Soll- / Istwert
TH1 = 035 026 °C
TH2 = 050 051 °C

Toleranz -/+
030 °C 010 °C
041 °C 011 °C

Heizen

000 %

Kühlen

005 %

DVD_F50 —

Fig. 41I